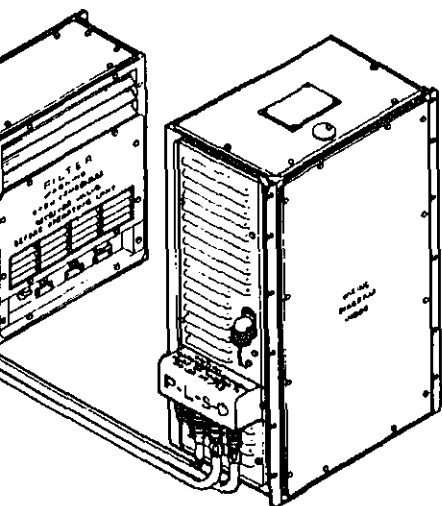


MAINTENANCE MANUAL

CH
AP

IONER: WALL OR BASE MOUNTED,
, MULTI-PACKAGE, STANDARD WEIGHT,
LED, 6,000 BTU/HR COOLING,
BTU/HR HEATING, CLASS 1
LE PHASE, 2-WIRE, 50/60 HERTZ
MODEL CE-6A-60

KECO MODEL F6000-7
NSN 4120-01-066-9677



INTRODUCTION

OPERATING INSTRUCTIONS

OPERATOR'S MAINTENANCE
INSTRUCTIONS

ORGANIZATIONAL
MAINTENANCE INSTRUCTIONS

DIRECT SUPPORT
MAINTENANCE INSTRUCTIONS

REFERENCES

MAINTENANCE
ALLOCATION CHART

EXPENDABLE SUPPLIES

WARNING**HIGH VOLTAGE**

ed in the operation of this equipment
DEATH ON CONTACT
 result if personnel fail to observe safety precautions

work on electronic equipment there is another person near- is familiar with the operation hazards of the equipment and competent in administering aid. When the technician is by operators, he must warn about dangerous areas.

over possible, the power sup- the equipment must be shut before beginning work on the ment. Take particular care to every capacitor likely to dangerous potential. When g inside the equipment, after ver has been turned off, al- ground every part before ng it.

areful not to contact high- e connections of 115 volts ac when installing or operating ipment.

over the nature of the opera- ermits, keep one hand away the equipment to reduce the d of current flowing through rgans of the body.

operate the equipment with- lles, louvers, and covers in and tightly secured.

ng: Do not be misled by the low voltage." Potentials as s 50 volts may cause death adverse conditions.

doors, such as during a welding operation nearby, you should take care to ventilate the area thoroughly. An exhaust system like that of a paint spray booth should be used.

Air-supplied respirators, approved by the National Institute for Occupational Safety and Health or the US Bureau of Mines, should be used for all welding in confined spaces and in places where ventilation is inadequate.

Persons who have chronic or recurrent respiratory conditions, including allergies and asthma, should not work in this area.

WARNING

Clean parts in a well ventilated area.

Avoid inhalation of solvent fumes and prolonged exposure of skin to cleaning solvent. Wash exposed skin thoroughly.

Dry cleaning solvent (Fed. Spec. P-D-680) used to clean parts is potentially dangerous to personnel and property.

Do not use near open flame or excessive heat. Flash point of solvent is 100°F to 138°F (38°C to 50°C).

Wear eye protection when blowing solvent from parts. Air pressure should not exceed 30 psig (2.1 kg/cm²).

WARNING**REFRIGERANT UNDER PRESSURE**

is used in the operation of this equipment.
DEATH

WARNING**DANGEROUS CHEMICAL**

is used in this equipment
DEATH
 or severe damage may result if personnel fail to observe safety precautions.

Use great care to avoid contact with liquid refrigerant or refrigerant being discharged under pressure. Sudden and irreversible damage can result from frostbite. Wear thermal protective gloves, a face protector or goggles in situation where skin- eye contact is possible.

Prevent contact of refrigerant with flame or hot surfaces. This causes the refrigerant to break down and form carbonyl chloride (phosgene), a highly toxic and corrosive gas.

WARNING**EQUIPMENT DAMAGE**

may be caused if unit is opened prior to opening of condenser receiver valve.

WARNING

Acetone and methyl-ethyl ketone (MEK) are flammable, and vapors can be explosive. After or prolonged skin contact or inhalation of vapors can be toxic. In a well-ventilated area, wear gloves and keep away from sparks and flames.

WARNING

OPERATOR'S, ORGANIZATIONAL AND DIRECT SUPPORT MAINTENANCE MANUAL

**AIR CONDITIONER: WALL OR BASE MOUNTED,
SELF-CONTAINED, MULTI-PACKAGE, STANDARD WEIGHT,
AIR COOLED, 6,000 BTU/HR. COOLING,
4,000 BTU/HR HEATING, CLASS 1
115 VOLT, SINGLE PHASE, 2-WIRE, 50/60 HERTZ**

REPORTING OF ERRORS

You can help improve this manual. If you find any mistake or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications) or DA Form 2028-2 located in the back of this manual direct to: Commander, U.S. Army, Support & Aviation Materiel Readiness Command, Attn: DRSTS-MTT, 4300 Goodfellow Boulevard, St. Louis, Mo. 63120. A reply will be furnished to you.

TABLE OF CONTENTS

CHAPTER	1.	INTRODUCTION
Section	I.	General Information
Section	II.	Equipment Description and Data
CHAPTER	2.	OPERATING INSTRUCTIONS
Section	I.	Description and Use of Operator's Controls and Indicators
Section	II.	Preventive Maintenance Checks and Services (PMCS)
Section	III.	Operation Under Usual Conditions
Section	IV.	Operation Under Unusual Conditions
CHAPTER	3.	OPERATOR'S MAINTENANCE INSTRUCTIONS
Section	I.	Lubrication Instructions
Section	II.	Troubleshooting
CHAPTER	4.	ORGANIZATIONAL MAINTENANCE INSTRUCTIONS
Section	I.	Repair Parts, Special Tools, TMDE, and Support Equipment
Section	II.	Service Union Receipt of Equipment

ion	II.	Maintenance Procedures
NDIX	A	REFERENCES
NDIX	B	MAINTENANCE ALLOCATION CHART
NDIX	C	EXPENDABLE SUPPLIES AND MATERIALS LIST

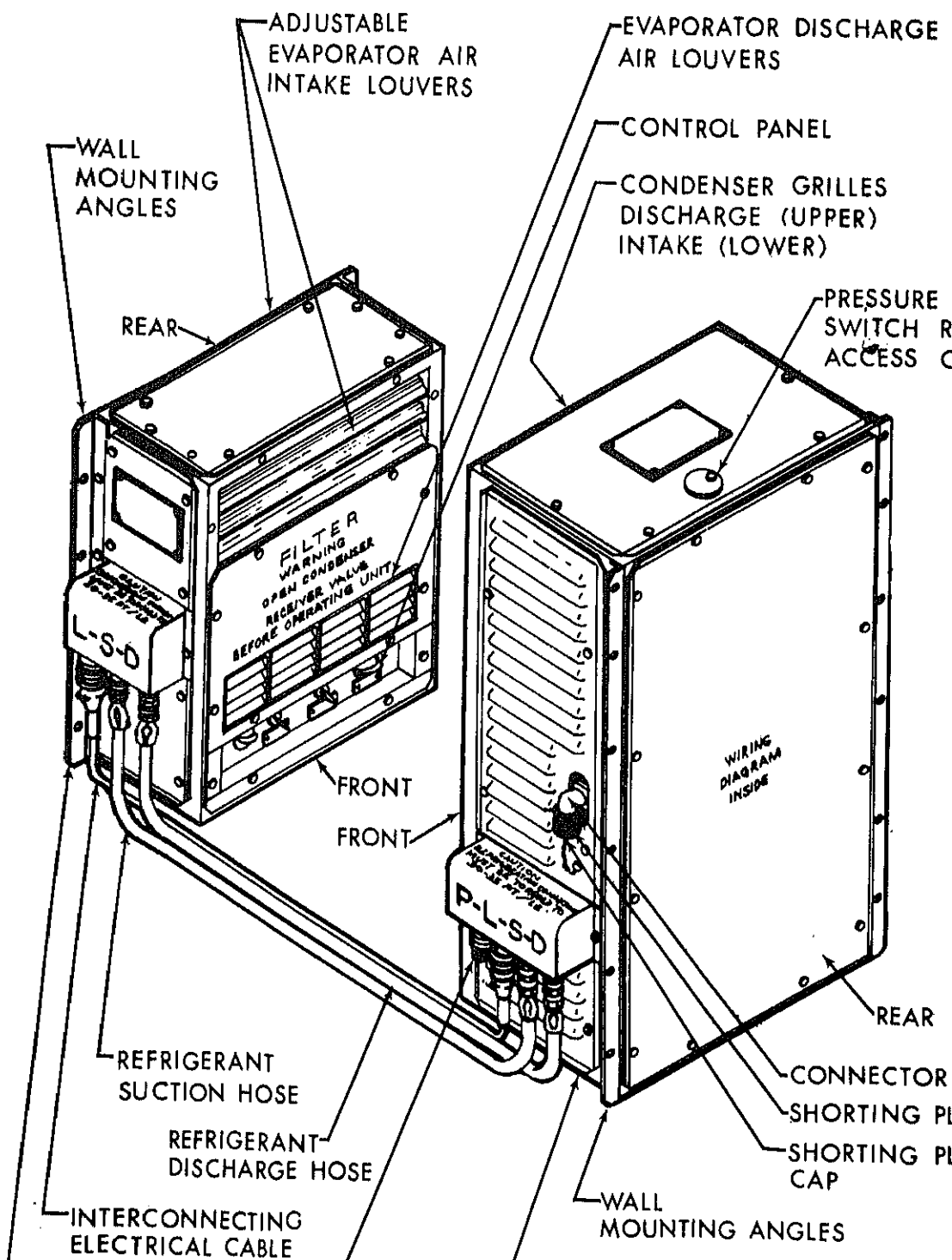
LIST OF ILLUSTRATIONS

e	Title
	Air Conditioner
	Evaporator Section, Location and Description of Major Components
	Condenser Section, Location and Description of Major Components
	Operator's Controls and Indicators
	Refrigeration Schematic
	Electrical Schematic
	Evaporator Section Stencils and Instruction Plates
	Condenser Section Stencils and Instruction Plates
	Floor Mounting Diagram
	Wall Mounting Diagram
	Location of PMCS Items, Condenser Section
	Location of PMCS Items, Evaporator Section
	Interconnecting Cable
	Interconnecting Hoses
	Wiring Diagram
	Panels and Grilles, Condenser Section (Front, Top and Left Side)
	Panels and Grilles, Condenser Section (Rear, Bottom and Right Side)
0	Wiring Harness, Condenser Section
1	Fuse, Condenser Section
2	Condenser Fan
3	Condenser Fan Motor
4	Pressure Switch
5	Rectifier
6	Refrigerant Piping, Condenser Section
7	Compressor Start Capacitor
8	Compressor Run Capacitor
9	Condenser Fan Motor Run Capacitor
0	Compressor Start Relay
1	Panels and Hood, Evaporator Section (Top, Right Side and Front)
2	Panels and Hood, Evaporator Section (Left Side, Back and Bottom)
3	Wiring Harness, Evaporator Section
4	Control Panel
5	Main Power On-Off Switch 2
6	Heat, Vent, Cool System Selector Switch 3
7	Thermostatic Temperature Control Switch 4
8	Fresh and Return Air Louvers and Switch
9	Evaporator Fan
0	Evaporator Fan Motor
1	Evaporator Fan Motor Run Capacitor

33	Relay and On/Off Control Section, Evaporator Section
34	Refrigerant Piping, Evaporator Section
35	Air Filter, Evaporator Section
1	Heating Unit, Evaporator Section
1	Typical Half Coupling

LIST OF TABLES

Number	Title
1	Preventive Maintenance Checks and Services
1	Troubleshooting
1	Installation Drilling Instructions
2	Preventive Maintenance Checks and Services
3	Troubleshooting
4	Wire List, Condenser Section
5	Wire List, Evaporator Section
1	Pressure-Temperature Relationship of Saturated Refrigerant 12



Section I.

GENERAL INFORMATION

1. SCOPE

This manual contains information on the operation, servicing and maintenance of the Model F6000 contained multi-package, air conditioner (figure 1-1) manufactured by Keco Industries, Inc., Cincinnati, Ohio. Chapters 1 through 3 comprise operating and servicing instructions for the operator. Chapter 4 comprises maintenance instructions concerning mechanical and electrical components for Organizational Maintenance personnel. Chapter 5 provides repair and replacement instructions to be used by Direct Support Maintenance personnel.

The purpose of the air conditioner is to provide cooled or heated air to maintain adequate working temperatures for efficient operation of electronic equipment and for the comfort of operating personnel.

2. MAINTENANCE FORMS AND RECORDS

The Department of the Army forms and procedures used for equipment maintenance will be those prescribed in DA Form 8-750, the Army maintenance Management System (TAMMS).

HAND RECEIPT MANUAL. Hand receipts for the End Item/Components of End Item Component, and Additional Authorization List (AAL) items are published in a Hand Receipt Manual. The manual numerical designation is the same as the related Technical Manual with the suffix number. These manuals are published to aid in property accountability and are available from the US Army Adjutant General publication Center, ATTN: AGDL-OD, 1655 Woodland Road, St. Louis, Missouri 63210.

3. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR's)

If your air conditioner needs improvement, let us know. Send us an EIR. You, the user, are the only one who knows what you don't like about your equipment. Let us know why you don't like the design. Tell us if the procedure is hard to perform. Put it on a SF 368 (Quality Deficiency Report). Mail it to us at Commander, US Army Troop Support and Aviation Materiel Readiness Command, ATTN: DRSTMEM, 1655 Woodland Blvd., St. Louis, Missouri, 63210. We'll send you a reply.

1-4. PURPOSE OF EQUIPMENT

The F6000-7 Air Conditioner is a multi-package, air cooled, electric motor driven unit. It is designed specifically to provide selected environmental conditioning in air transportable shelters and mobile, van type truck trailers for efficient operation of electronic equipment and for the comfort of operating personnel.

1-5. CAPABILITIES AND FEATURES**Major Components:****a. Evaporator Section**

- (1) Control Panel
- (2) Adjustable air intake louvers
- (3) Evaporator fan and motor
- (4) Air filter
- (5) Evaporator coil
- (6) Expansion valve
- (7) Heater coil
- (8) Adjustable discharge air louvers

b. Condenser Section

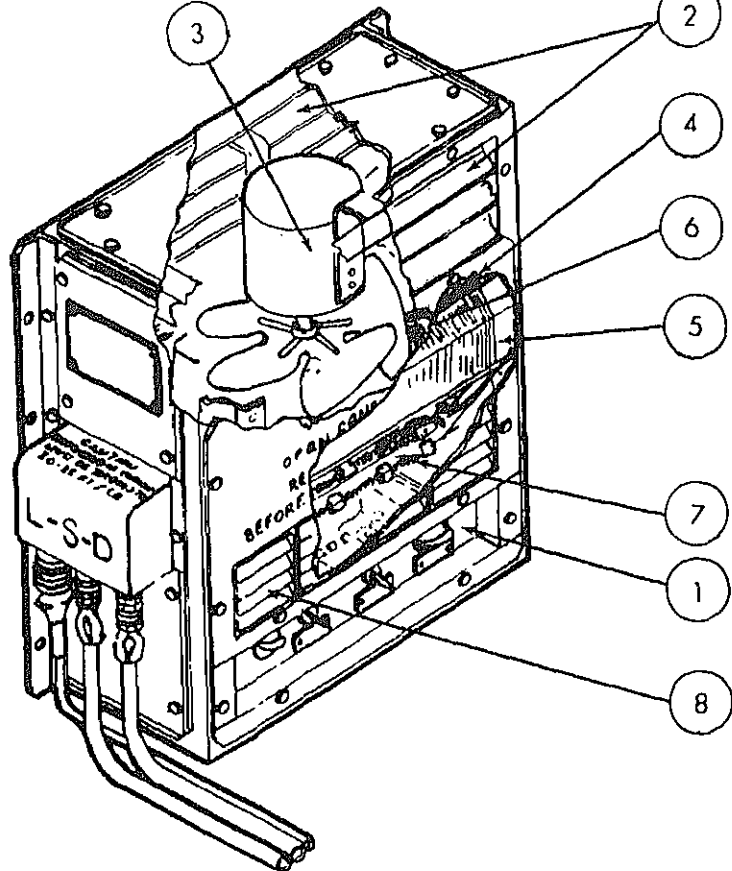
- (1) Intake air grille
- (2) Discharge air grille
- (3) Intake fixed louver panel
- (4) Condenser fan and motor
- (5) Compressor
- (6) Condenser coil
- (7) Receiver
- (8) Sight glass liquid indicator

c. Interconnecting electrical cable and refrigerant hoses.

. Easily air transportable

. 6000 BTU/HR cooling

. 4000 BTU/HR heating



CONTROL PANEL (1). Contains the following controls; main power on-off switch, heat-vent-cool thermostatic switch, and the fresh and return air louver control.

ADJUSTABLE AIR INTAKE LOUVERS (2). Allows fresh, return or any combination of air intake. They are mechanically controlled from a knob on the control panel.

EVAPORATOR FAN AND MOTOR (3). Pulls air in thru intake louvers and blows air across filter coil, and heater coil to discharge air louvers.

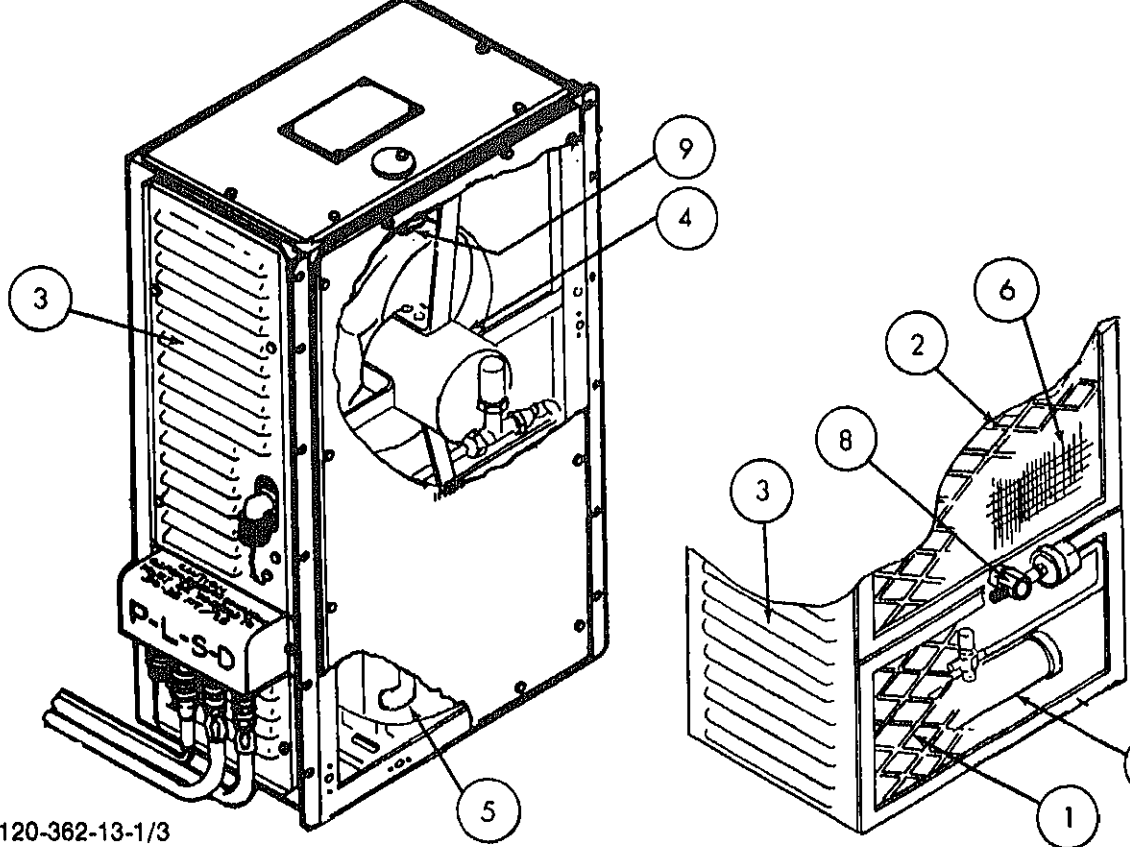
AIR FILTER (4). Removes dust, dirt and other airborne debris from the air.

EVAPORATOR COIL (5). Consists of a copper tube coil and aluminum fin assembly with appropriate flanges. Removes heat from the air by transferring it to the refrigerant.

EXPANSION VALVE (6). Controls refrigerant flow to the evaporator coil.

HEATER COIL (7). Consists of an electric resistance coil used to add heat to the air passing through the unit.

ADJUSTABLE AIR LOUVERS (8). Directs conditioned air. Pull out and turn to desired direction.



4120-362-13-1/3

INTAKE AIR GRILLE (1). Consists of protective expanded metal grille.

CHARGE AIR GRILLE (2). Consists of a protective expanded metal grille.

INTAKE AIR FIXED LOUVER PANEL (3). Consists of formed sheet metal louvered panels.

CONDENSER FAN AND MOTOR (4). Pulls air in thru Intake grille and fixed louver panels and blows air across condenser coil.

COMPRESSOR (5). Consists of a reciprocating compressor driven by an electric motor hermetically sealed in a steel container.

CONDENSER COIL (6). Consists of a copper tube coil and aluminum fin assembly with appropriate mounting brackets. Removes heat from the refrigerant by transferring it to the air.

RECEIVER (7). Consists of a steel container for collecting the high pressure liquid refrigerant from the condenser coil.

VIEW-GLASS LIQUID INDICATOR (8). The condition of the liquid refrigerant flowing thru the system can be observed thru this window when the compressor is operating in the cooling mode.

PRESSURE SWITCH (9). If the refrigerant pressure exceeds the maximum set point for the switch, an electrical connection is opened to stop the compressor. Must be manually reset.

Figure 1-3. Condenser Section, Location and Description of Major Components.

Cooling	60°F (+16°C) to +125°F (+52°C)
Heating	-65°F (-54°C) to +80°F (+27°C)

PERFORMANCE

Cooling Capacity	5800 BTU/HR
Heating Capacity	4000 BTU/HR

WEIGHTS AND DIMENSIONS

Evaporator Section

Height	18 inches (45.72 cm.)
Width	8-1/2 inches (21.59 cm.)
Length	17-5/16 inches (44.3 cm.)
Weight	35 pounds (15.75 kg.)

Condenser Section

Height	26 inches (66 cm.)
Width	9-1/4 inches (23.5 cm.)
Length	17-9/16 inches (44.6 cm.)
Weight	95 pounds (42.75 kg.)
Shipping Weight	140 pounds (62 kg.)

POWER REQUIRED

Voltage	115
Phase	Single
Hertz	50/60

REFRIGERANT

Type	R-12
Charge	2.5 pounds (1.14 kg.)

ption and Use of Operator's Controls and	I
ors.	
operator's Controls and Technical Principles	2-1
operation	
ative Maintenance Checks and Services	II
)	
eral.	2-2
ion Under Usual Conditions	III
rating Procedure	2-3
operation for Movement.	2-4
sembly and Preparation for Use.	2-5
al Adjustments and Checks	2-6

Operating Instructions on Decals and	
Instruction Plates.	
Operation Under Unusual Conditions	
General Information	
Operation in Extreme Cold	
Operation in Extreme Heat	
Operation in Dusty or Sandy Areas	
Operation Under Rainy or Humid Conditions .	
Operation in Salt Water Areas	
Operation at High Altitudes.	
Emergency Procedures	
Administrative Storage.	

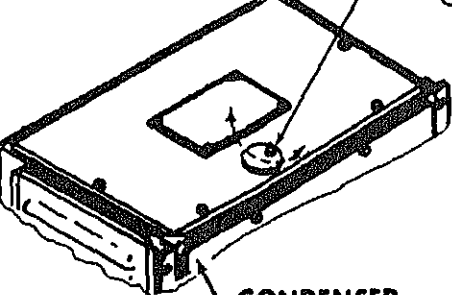
Section I.

DESCRIPTION AND USE OF OPERATOR'S CONTROLS AND INDICATORS

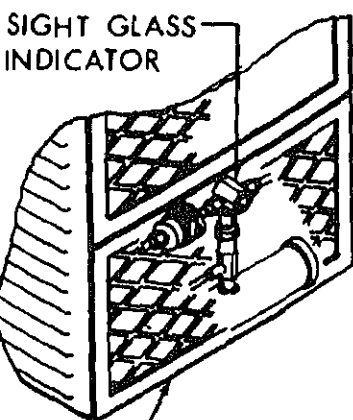
OPERATOR'S CONTROLS AND TECHNICAL PRINCIPLES OF OPERATION

Control Panel. The control panel is located on the evaporator section below the discharge louver. It contains the following operating controls. See figure 2-1.

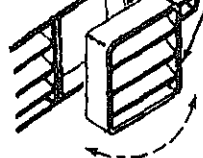
- (1) Switch 1. Switch 1 is marked SW1, FRESH AIR, 0-100% and controls the mixture of fresh and air that is supplied to the evaporator system. It is a mechanical device which acts through a wheel to position the interlocked fresh and return air louvers. Since both louvers operate from a single control, when one is open, the other is closed. Both can be partly open.
- (2) Switch 2. Switch 2 is marked SW2, OFF-ON. This is the unit's main power switch. When set in the OFF position the components of the air conditioner are inoperative and deenergized. In the ON position the evaporator fan operates and the components of the air conditioner function in accordance with the settings of switches 3 and 4.
- (3) Switch 3. Switch 3 is marked SW 3, HEAT, VENT, COOL and is the system selector switch. When Switch 2 is in the ON position, Switch 3 operates as follows:
 - (a) Set to HEAT, the evaporator fan motor operates and the electric heaters are energized, the condenser fan and compressor motors do not operate. Note that Switch 4 must be adjusted to a high temperature setting.
 - (b) Set to VENT, the evaporator fan motor operates, but neither heating nor cooling takes place.
 - (c) Set to COOL, when cooling is required, the evaporator fan, condenser fan, and compressor motors operate and the electric heater is deenergized. When the return air temperature is below the set point of Switch 4 and no cooling is required, the evaporator fan motor continues to operate. The condenser fan and compressor motors do not operate and the electric heater is deenergized. Note that Switch 4 must be adjusted to a cool temperature setting.



CONDENSER SECTION UPPER REAR VIEW

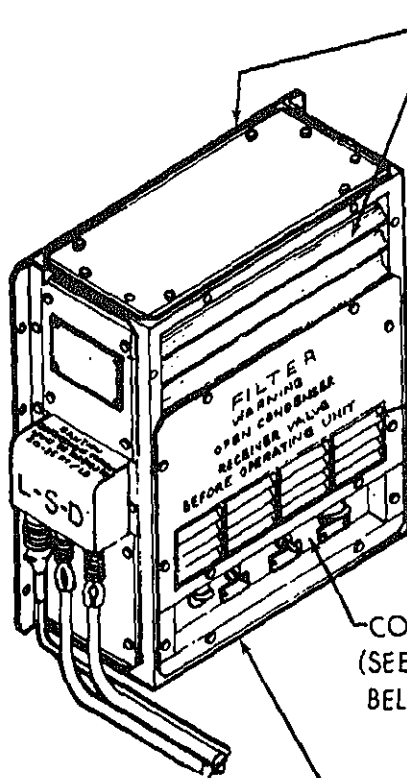


CONDENSER SECTION LOWER FRONT VIEW



(ALL FOUR LOUVERS ARE ADJUSTABLE)

DISCHARGE AIR LOUVERS



FRESH AND RETURN AIR INTAKE LOUVER ADJUSTED BY SWITCH 1 ON CONTROL PANEL

DISCHARGE AIR LOUVERS (SEE VIEW ABOVE)

CONTROL PANEL (SEE ENLARGED VIEW BELOW)

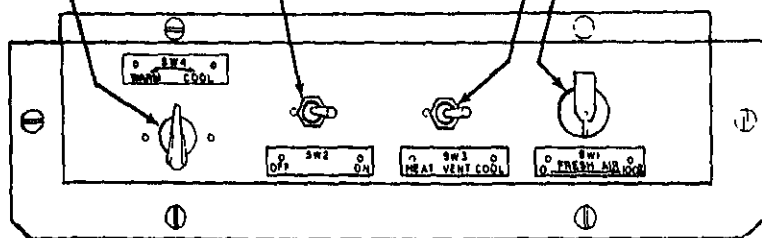
EVAPORATOR SECTION

SWITCH 4 THERMOSTATIC TEMPERATURE CONTROL

SWITCH 2 MAIN POWER OFF-ON

SWITCH 3 HEAT, VENT, COOL SYSTEM SELECTOR SWITCH

SWITCH 1 FRESH AND RETURN AIR LOUVER ADJUSTING SWITCH



from liquid to vapor absorbs heat from the air directed over the outside surfaces of the evaporator coil. The evaporator fan, thereby cooling the air. The vaporized refrigerant is piped from the evaporator coil through the line shut off valve (V2) to the compressor (B2) where it is compressed and its temperature is raised. The compressed vapor is then piped to the condenser coil (C) where air passes over the outside surface of the coil driven by the condenser fan. The cooler air extracts the heat of evaporation and compression from the refrigerant, recondensing it to a liquid. The liquid flows to the receiver (R) where it is collected under high pressure. When it flows through the filter-drier (D) and the sight glass (G) to the expansion valve (V1) which meters the refrigerant into the evaporator coil to repeat the cycle.

Switch 4. Switch 4 is marked SW4, WARM-COOL and is a thermostatic switch which controls the heating and cooling elements of the system. The temperature is maintained, within the limits of the unit's capacity, at the switch setting valve. The temperature sensing bulb is attached in the return air stream.

Airflow Controls. Airflow is controlled by the proper adjustment of louvers on the evaporator section.

Adjustable Evaporator Air Intake Louvers. These louvers are located on the front and back of the evaporator section toward the top. If the installation allows it, fresh air may be supplied to the evaporator system as well as return air. SW1 controls the mixture by positioning the interlocked louvers.

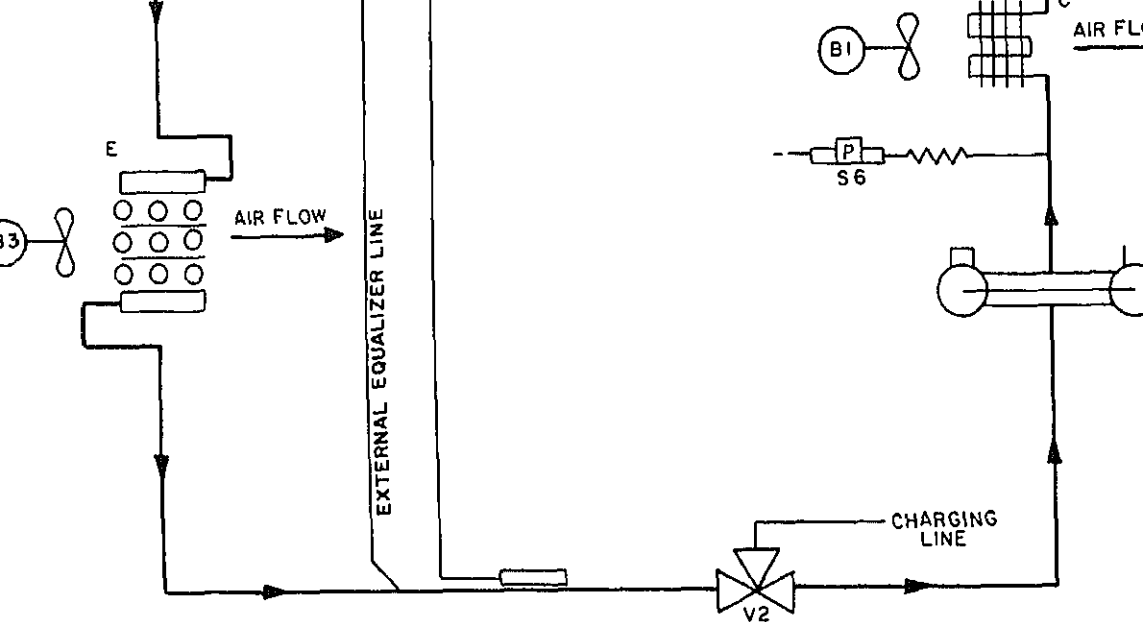
Evaporator Discharge Air Louvers. These louvers located above the control panel on the evaporator section are always open. They provide limited control of the direction of airflow. Each of the louver assemblies may be rotated in 90° increments. This is done by first pulling the assembly toward the operator on its spring held retainer, turning it and allowing it to spring back in place. See figure 2-1.

NOTE

Cool air is denser than warm air and tends to sink downward. Therefore, it is usually desirable to direct cool air upward and warm air downward for maximum comfort and coverage.

Resettable Automatic Controls. There is one automatic control that can stop the air conditioner. It is a high pressure cutout switch which deenergizes the air conditioner when the condensing pressure reaches 325 ± 10 psig (22.85 ± 0.07 Kgm/Cm²). It is mounted in the condenser section toward the top. Access is obtained by rotating the pressure switch access cover so that the reset button is exposed. See figure 2-1. Press and release the button to reset the switch. If ineffective, report the trouble to organizational maintenance.

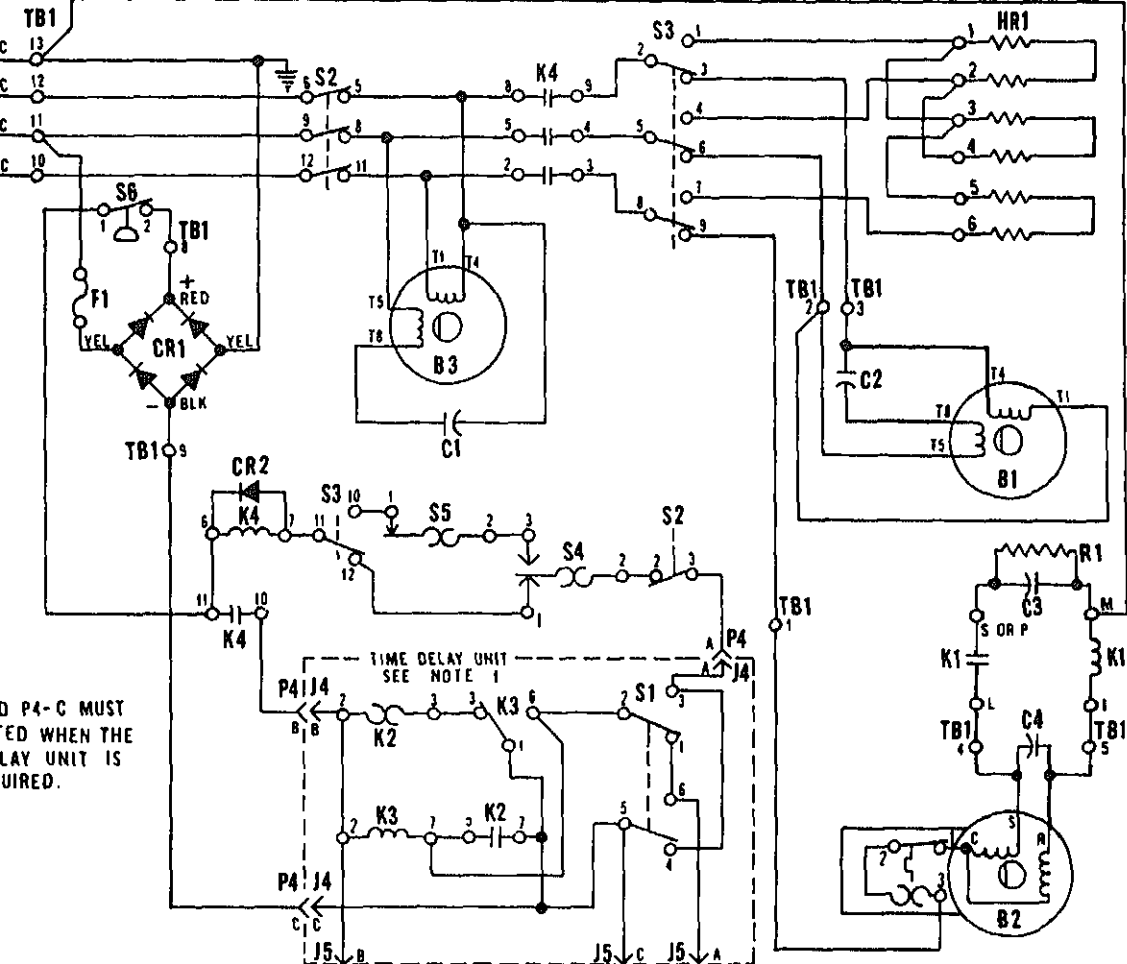
Sight-Glass Indicator. The sight-glass indicator is the only indicator incorporated in the air conditioner. See figure 2-1. This circular window into the refrigerant liquid shows the condition of the refrigerant and should be inspected periodically as directed in Table 2-1. The bullseye in the center of the sight glass should be green. If chartreuse (yellow-green) or yellow colors are indicated, the refrigerant contains moisture. If the sight glass shows a milky or bubbly appearance, the refrigerant is low. Both conditions should be reported to direct support maintenance.



LEGEND	
REF DESIGNATION	DESCRIPTION
B1	FAN MOTOR , CONDENSER
B2	COMPRESSOR
B3	FAN MOTOR , EVAPORATOR
R	RECEIVER WITH OUTLET VALVE AND FUSIBLE PLUG
D	FILTER DRIER
G	SIGHT GLASS
VI	VALVE, EXPANSION
C	COIL , CONDENSER
E	EVAPORATOR
V2	VALVE, LINE SHUT OFF
S6	SWITCH, PRESSURE

TS 4120-362-1

Figure 2-2. Refrigeration Schematic.



CONTROL CIRCUIT SHOWN. UNITS S2 CLOSED, S3 IN COOLING POSITION AND S1 IN POSITION FOR THIS UNIT TO CONTROL THE SECOND AIR CONDITIONER

LEGEND

SYM	NAME	SYM	NAME	SYM	NAME	SYM	NAME
B1	MOTOR	F1	FUSE	K3	RELAY	S2	SWITCH, TOGGLE
B2	COMPRESSOR	HRI	COIL, HEATER	K4	RELAY	S3	SWITCH, TOGGLE
B3	MOTOR	J1	CONNECTOR, 90°	P1	CONNECTOR	S4	CONTROL THERMOSTAT
C1	CAPACITOR, MOTOR RUN	J2	CONNECTOR	P2	CONNECTOR	S5	THERMOSTAT
		J3	CONNECTOR	P3	CONNECTOR		
G2	CAPACITOR, MOTOR RUN	J4	CONNECTOR	P4	CONNECTOR	S6	SWITCH PRESSURE
G3	CAPACITOR	J5	CONNECTOR	P5	CONNECTOR	TB1	TERMINAL BOARD
G4	CAPACITOR	J7	CONNECTOR	P6	CONNECTOR		
CRI	RECTIFIER	K1	RELAY	P7	CONNECTOR	JK2	SOCKET
				P8	SHORTING PLUG		
CR2	RECTIFIER, JCT. SILICON	K2	RELAY, THERMAL TIME DELAY	R1	RESISTOR	JK3	SOCKET
				S1	SWITCH, TOGGLE	JK4	SOCKET

Preventive maintenance checks and services are required to keep the air conditioner operating efficiently to prevent damage caused by neglect. Table 2-1 contains the listing of periodic checks and services required.

- a. **Before you operate.** Always keep in mind the CAUTIONS and WARNINGS. Perform your before (B) PMCS.
- b. **While you operate.** Always keep in mind the CAUTIONS and WARNINGS. Perform your during (D) PMCS.
- c. **After you operate.** Be sure to perform your after (A) PMCS.
- d. **If your equipment fails to operate.** Troubleshoot with proper equipment. Report any deficiencies on the proper forms, see TM 38-750.

Table 2-1.

PREVENTIVE MAINTENANCE CHECKS AND SERVICES

NOTE

Within designated intervals, these checks are to be performed in the order listed.

If the equipment must be kept in continuous operation, check and service only those items that can be checked and serviced without disturbing operation. Make the complete checks and services when the equipment can be shut down.

B — Before
D — During

A — After
W — Weekly

M — Monthly

•				Condenser intake and discharge grilles	Inspect for loose mounting, obstructions and general condition. See figure 1-3	Grilles are missing
•				Evaporator Adjustable air intake louvers	Inspect for loose mounting, obstructions and general condition. See figure 1-2	Louvers are missing
•				Interconnecting cable and hoses	See that connectors make firm and secure contact. See figure 1-1	
	•			Refrigerant sight glass. See figure 2-1	After 15 minutes of operation in maximum cooling, check for bubbles or milky flow indicating low refrigerant charge. Check for yellow color which indicates presence of moisture. Observe through opening in condenser intake grille.	Bubbles, milky flow, yellow color is observed
•				Control panel operating controls. See figure 2-1	Inspect for damage, secure mounting and proper operation.	Control panel is damaged or operating improperly

2-3. OPERATING PROCEDURE

- a. All modes of operation are controlled from the control panel on the evaporator section. Output is controlled by the discharge louvers in the evaporator section and do not require readjustment when a different pattern of coverage is desired or to accommodate the heating or cooling paragraph 2-1b.

WARNING

Open condenser receiver valve before operating unit.

CAUTION

Make sure shorting plug and cap are in place. See figure 1-1.

- b. Starting the unit.

- (1) Check to see that instructions of paragraphs 2-5, 2-6, 4-4 and 4-5 Assembly and Preparation and Initial Adjustment and Checks, have been carried out.
- (2) Adjust SW1 for desired fresh air and return air mixture.
- (3) Set SW3 to VENT position.
- (4) Set SW2 to ON position.

- c. Cooling Operating Instructions.

- (1) Set SW3 to COOL position.
- (2) Adjust SW4 for desired temperature.

- d. Heating Operating Instructions.

- (1) Set SW3 to HEAT position.
- (2) Adjust SW4 for desired temperature.

- e. Ventilation Operating Instructions.

- (1) Adjust SW1 for desired fresh air and return air mixture.
- (2) Set SW3 to VENT position.
- (3) Set SW2 to ON position.

- f. Normal Shutdown. To shut down the air conditioner, turn SW2 to OFF position.

2-4. PREPARATION FOR MOVEMENT

- a. Inspect all panels, hoods, grilles and louvers for loose mounting, obstructions or shipping damage that all interconnecting cables and hoses are properly in place and that connections are tight. that there are no kinks and that the installation has not created a tripping hazard. Inspect for visual damage and loose mountings. Report any deficiencies to organizational maintenance.
- b. Perform the preventive maintenance checks and services listed in Table 2-1.

2-7. OPERATING INSTRUCTIONS ON DECALS AND INSTRUCTION PLATES

- a. The unit does not contain a step by step instruction plate or decal.
- b. See figure 2-4 for evaporator section stencils and instruction plates.
- c. See figure 2-5 for condenser section stencils and instruction plates.

Section IV.

OPERATION UNDER UNUSUAL CONDITIONS

2-8. GENERAL INFORMATION

The air conditioner is designed to operate normally within a wide range of climatic conditions. However, extreme conditions require special operating and servicing procedures to maintain high efficiency and reduce wear.

2-9. OPERATION IN EXTREME COLD

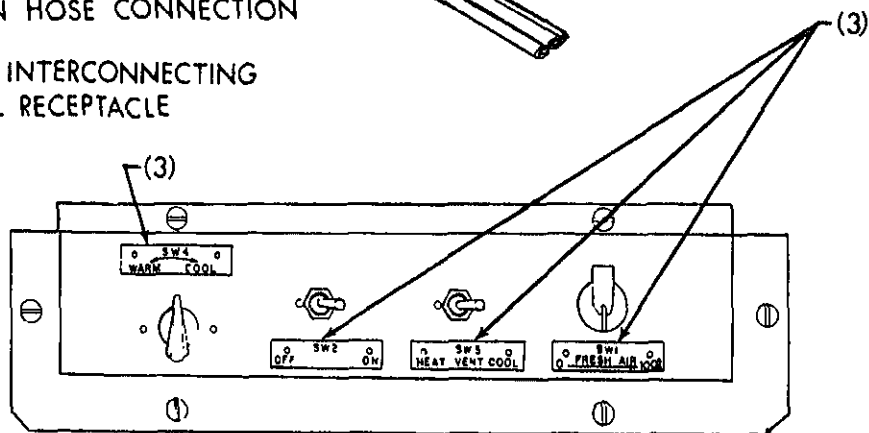
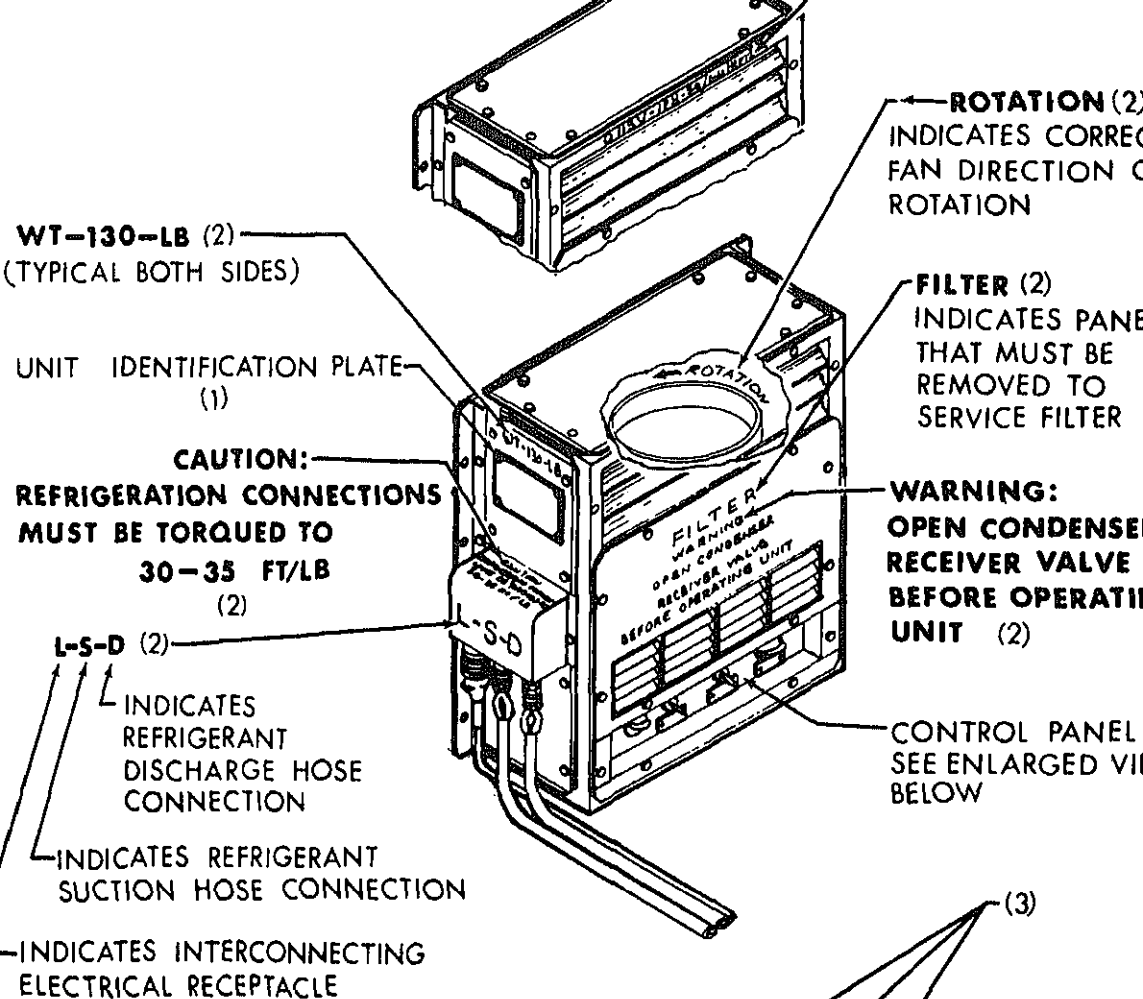
The air conditioner is designed to operate in temperatures as low as 0° F (-18°C) in the cooling mode and in temperatures as low as -65° (-54°C) in the heating mode.

CAUTION

Operation of either evaporator or condenser fan motors below -65°F (-54°C) can result in damage to equipment.

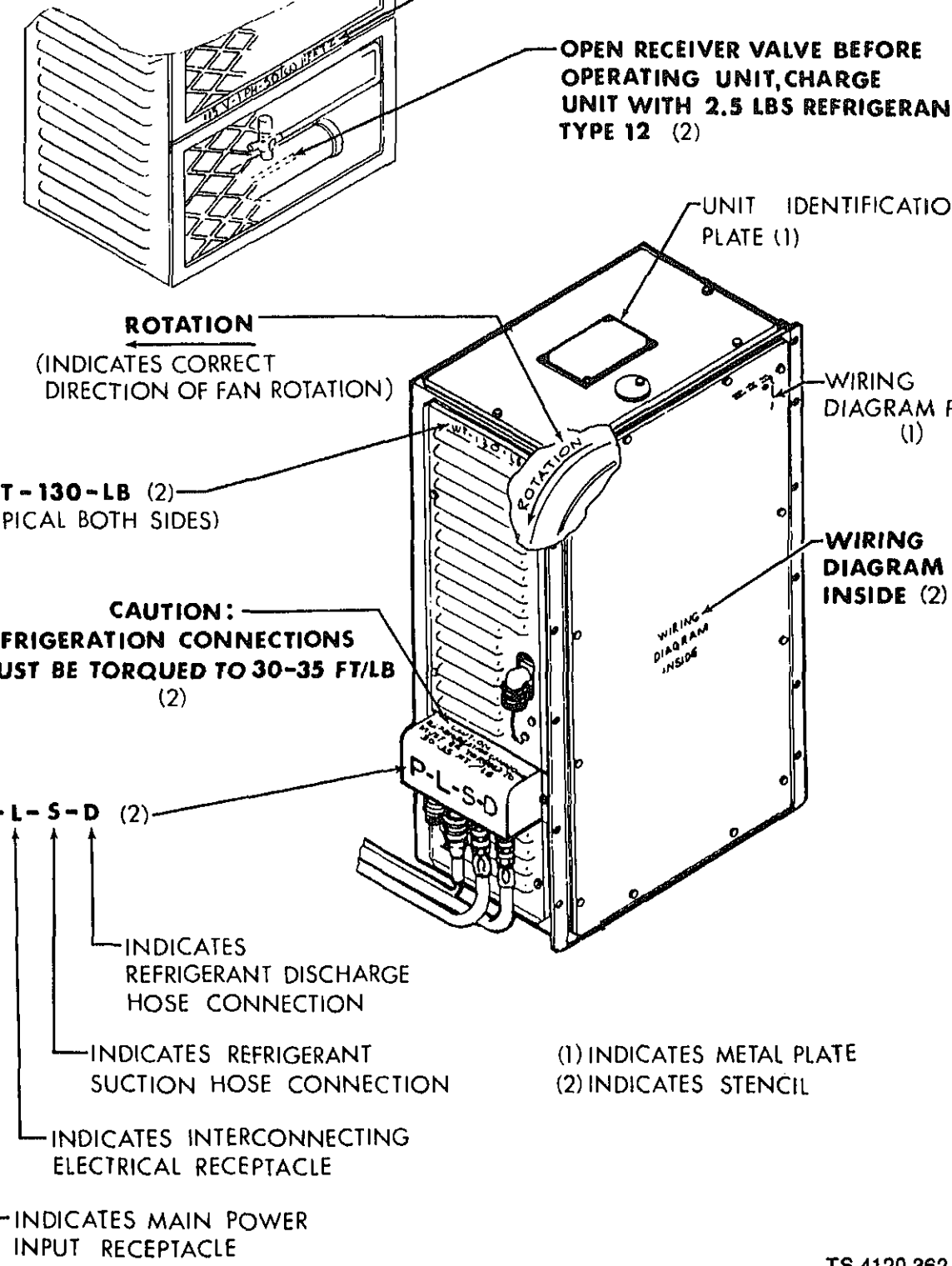
At extremely low temperatures, extra care should be taken to reduce heat loss of the enclosure by:

- a. Weather-stripping windows and doors.
- b. Insulating surfaces exposed to the outside.
- c. Limiting the amount of outside air drawn in through the fresh air louver of the evaporator. Do not disconnect wiring during extremely cold weather. Wire and insulation become brittle, and are easily broken.



CONTROL PANEL VIEW

- (1) INDICATES METAL PLATE
(2) INDICATES STENCIL
(3) INDICATES PLASTIC PLATE



extremely high temperatures, extra care should be taken to reduce the cooling load of the enclosure.

- a. Checking openings such as doors and windows to be sure that they are tightly closed.
- b. Using window shades to shut out direct rays of the sun.
- c. Limiting the use of electric lights and other heat producing equipment.
- d. Limiting the introduction of outside air through the fresh air louver of the evaporator.

-11. OPERATION IN DUSTY OR SANDY AREAS

and, dust, dirt, smoke, soot and other debris can seriously reduce the efficiency of the air conditioner. When contamination is a problem, it is essential that the frequency of maintenance performed by organizational maintenance on the coils, filter and fans be increased.

-12. OPERATION UNDER RAINY OR HUMID CONDITIONS

The air conditioner is reasonably weatherproof, however, during periods of extremely wet, windy and harsh weather, the following precautions should be observed to provide maximum protection to the unit and to assure efficient operation:

- a. Shield all air inlet and outlets from the rain.
- b. Keep all electrical components clean and dry.
- c. Increase the frequency of maintenance performed by organizational maintenance on the coils, drain and outer surfaces under these extreme conditions.

-13. OPERATION IN SALT WATER AREAS

- a. Keep all electrical components clean and dry.
- b. Increase the frequency of maintenance performed by organizational maintenance on the coils, drain and outer surfaces under these extreme conditions.
- c. Exposed areas should be spray-rinsed or sponged with clear water periodically to remove salt encrustations.

-14. OPERATION AT HIGH ALTITUDES

There are no special instructions regarding operation and servicing the unit at high altitudes. However, the frequency of maintenance performed by organizational maintenance on the air filter should be increased under these extreme conditions.

-15. EMERGENCY PROCEDURES

To conserve available power during periods when full 115 V, single phase power is not available, the air conditioner should be operated in the ventilate mode only. Do not operate under 90 volts.

Take into account environmental conditions, such as extreme cold or heat, high humidity, blowing earthquakes, or combinations thereof, and take adequate precautions.

Establish a fire plan, and provide for adequate precautions.

Refer to TM 740-90-1 (Administrative Storage of Equipment) for detailed information on Administrative Storage.

LUBRICATION INSTRUCTIONS

GENERAL

compressor is hermetically sealed, with a charge of oil included. The condenser fan and evaporator incorporate sealed bearings, so that no lubrication is required. When necessary to relieve binding of blades, fasteners, etc., an application of light machine oil may be worked into the joint or pivot. Excess oil should be blotted up with a cloth or paper towel.

Section II.

TROUBLESHOOTING

USE OF TABLE

Troubleshooting Table 3-1 contains information useful in diagnosing and correcting unsatisfactory operation or failure of the air conditioner.

Table 3-1 lists the common malfunctions which you may find during the operation or maintenance of the air conditioner or its components. You should perform the tests/inspections and corrective actions listed under the malfunction.

This manual cannot list all malfunctions that may occur, nor all tests or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, notify your supervisor.

Any trouble or corrective action beyond the scope of operator maintenance shall be reported to organizational maintenance.

1. AIR CONDITIONER DOES NOT START

Check to be sure main power cable is connected.

Connect power cable.

2. COMPRESSOR FAILS TO START

Step 1. Check switch SW3 for COOL setting.

Place switch SW3 in COOL position.

Step 2. Check if switch SW4 is not set at low enough temperature.

Turn switch SW4 clockwise.

3. INSUFFICIENT COOLING

Step 1. Check evaporator air intake and outlet louvers to make sure they are open, able to provide adequate air output.

Open or remove obstruction.

Step 2. Check thermostatic temperature control switch SW4 setting.

Set thermostat at maximum clockwise COOL setting.

Step 3. Check sight glass liquid indicator for bubbles.

If bubbles exist, report condition to organizational maintenance.

4. REDUCED HEATING CAPACITY

Step 1. Check thermostatic temperature control switch SW4 setting.

Set thermostat at maximum counterclockwise WARM setting.

Step 2. Check switch SW1 air louver adjusting switch.

Adjust to admit less cold fresh air.

5. LOUVERS FAIL TO OPERATE

Step 1. Check linkage for possible binding.

Report to organizational maintenance.

Step 2. Check for foreign object in louver blades.

Remove foreign object from louver blades.

6. HEATER FAILS TO OPERATE WHEN EVAPORATOR FAN OPERATES

Step 1. Check if switch SW3 is in HEAT position.

Place switch SW3 in HEAT position.

Step 2. Check if switch SW4 is not set at warm enough temperature.

Turn switch SW4 counterclockwise.

Parts, Special Tools, TMDE, and Support Equipment.....	I
General.....	4-1
Upon Receipt of Equipment	II
Packing	4-2
Unpacking Unpacked Equipment	4-3
Installation Instructions.....	4-4
Initial Adjustments and Checks	4-5
Preventive Maintenance Checks and Services (PMCS)	III
Introduction	4-6
Troubleshooting	IV
General	4-7
Maintenance Procedures	V
Connecting Cable Assembly	4-8
Refrigerant Hoses.....	4-9
Electrical Connector (Power Supply).....	4-10
Panels, Grilles and Hood (Condenser Section).....	4-11
Electrical Connector (Shorting Plug).....	4-12
Electrical Wiring (Condenser Section)	4-13
Fan (Condenser Section)	4-14
Condenser Fan	4-15
Condenser Fan Motor	4-16
Pressure Switch (Condenser Section).....	4-17
Rectifier (Condenser Section).....	4-18
Refrigerant Piping (Condenser Section)	4-19
Service Valve (Condenser Section)	4-20
Couplings (Both Sections).....	4-21
Compressor (Condenser Section).....	4-22
Compressor Start Capacitor (Condenser Section).....	4-23
Compressor Run Capacitor (Condenser Section).....	4-24

Condenser Fan Motor Run Capacitor (Condenser Section)	
Compressor Start Relay (Condenser Section).....	
Sight Glass (Condenser Section)	
Receiver (Condenser Section).....	
Condenser Coil (Condenser Section)	
Frame (Condenser Section)	
Panels, Grilles and Hood (Evaporator Section).....	
Electrical Wiring (Evaporator Section)	
Control Panel (Evaporator Section).....	
Main Power Off-On Switch 2	
Heat, Vent, Cool System Selector Switch 3.....	
Thermostatic Temperature Control Switch 4	
Fresh and Return Air Louver Switch 1 and Fresh and Return Damper Assembly.....	
Evaporator Fan	
Evaporator Fan Motor	
Evaporator Fan Motor Run Capacitor.....	
Power Relay (Evaporator Section)	
Silicon Junction Rectifier (Evaporator Section).....	
Refrigerant Piping (Evaporator Section)	
Expansion Valve (Evaporator Section)	
Air Filter (Evaporator Section).....	
Heating Unit (Evaporator Section)	
Evaporator Coil.....	
Frame (Evaporator Section).....	
Preparation For Storage or Shipment	

Section I.

REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

GENERAL

For authorized common tools and equipment, refer to the Modified Table of Organization and Equipment (MTOE) applicable to your unit.

No special tools are required for maintenance of the equipment. Test, maintenance and diagnostic equipment (TMDE) and support equipment include standard pressure and vacuum gages, vacuum pump, charging manifolds found as standard equipment in any refrigeration shop.

Repair parts are listed and illustrated in the Repair Parts and Special Tools (RPSTL) Illustration 5-4120-362-23P covering organizational and direct support maintenance for this equipment.

Carefully remove air conditioner from crate or material used to ship it, including plastic wrapping. Also separate interconnecting hoses and cable from packing.

If evaporator and condenser sections are bolted together, separate them.

Remove protective dust caps from receptacles.

Unplug interconnecting hoses.

Set sections in upright position for checking.

CHECKING UNPACKED EQUIPMENT

Check the air conditioner in accordance with the following instructions:

Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, report the damage on DD Form 6, Packaging Improvement Report.

Check the equipment against the packing slip to see if the shipment is complete. Report all discrepancies in accordance with the instructions of TM 38-750.

Check to see whether the equipment has been modified.

Inspect entire air conditioner for missing or loose hardware or any defects that may have occurred during shipment.

Thoroughly check to see that all wiring, lines and tubing are secure. Especially inspect the evaporator and condenser coils and main power receptacle connector.

Be sure all visible wiring and insulation is not frayed or broken.

Check the evaporator and condenser fan motors for free rotation.

INSTALLATION INSTRUCTIONS

Observe the following requirements and recommendations when installing the air conditioner.

Select a site with the following requirements.

- (1) The air conditioner must have an unobstructed flow of air in order to operate efficiently. Make use of terrain features, trees and buildings if possible to provide a shaded location. This minimizes the cooling load on the refrigeration system.
- (2) Try to place the unit so that prevailing winds do not blow toward the face of the condenser unit.
- (3) Do not locate the condenser unit where intake air is likely to be laden with dust, dirt, soot, smoke or other debris.
- (4) Location of the evaporator section is determined by the internal layout of the enclosure to be conditioned and the length of interconnecting hoses. As far as possible, locate the unit so that the conditioned air discharges toward the area most critically in need of cooling. Discharge direction can be controlled somewhat by adjustment of the discharge louvers. The installation should allow access

3) The unit should be located as near as possible to a source of 115-volt, single phase, 50/60 hertz electric power. The electrical power supply receptacle is located on the condenser section (figure 4-1).

The evaporator and condenser sections are designed for wall or floor mounting. See Table 4-1, figures 4-1 and 4-2.

TABLE 4-1 — INSTALLATION DRILLING INSTRUCTIONS

Type of Mounting	Condenser Section	Evaporator Section
Floor	Drill four 0.50 in. (1.27 cm) diameter holes per figure 4-1. Use four .3125-24 UNF (length as required) bolts for mounting.	Drill four 0.50 in. (1.27 cm) diameter holes per figure 4-1. Use four .3125-24 UNF (length as required) bolts for mounting. Drill two 0.69 in. (1.75 cm) diameter drainage holes.
Wall	Drill ten holes for 0.25 in. (0.63 cm) diameter bolts or lag screws per figure 4-2.	Drill eight holes for 0.25 in. (0.63 cm) diameter bolts or lag screws per figure 4-2.

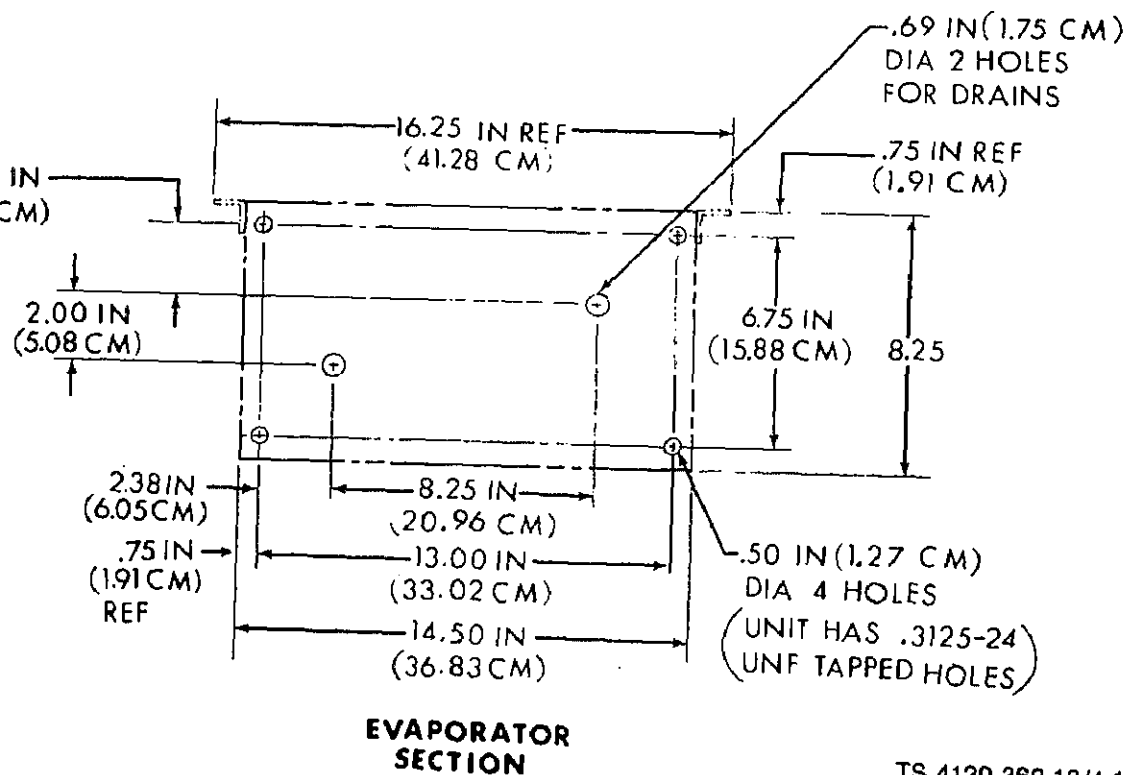
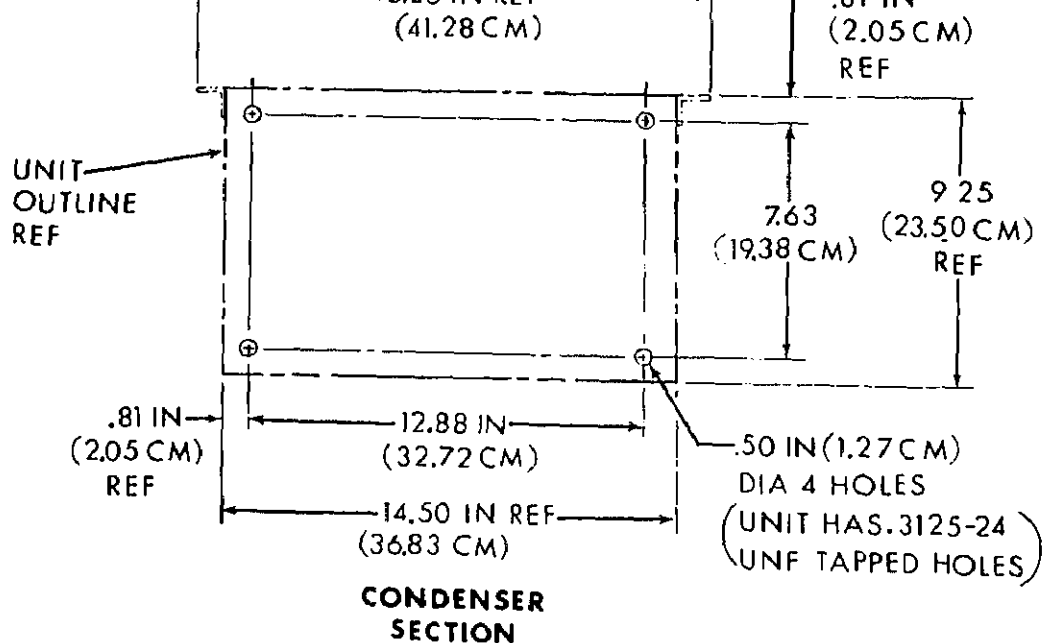
The evaporator section should be mounted on a level supporting surface. If a level surface is not obtainable, the unit may be mounted at an angle no greater than five degrees from the horizontal.

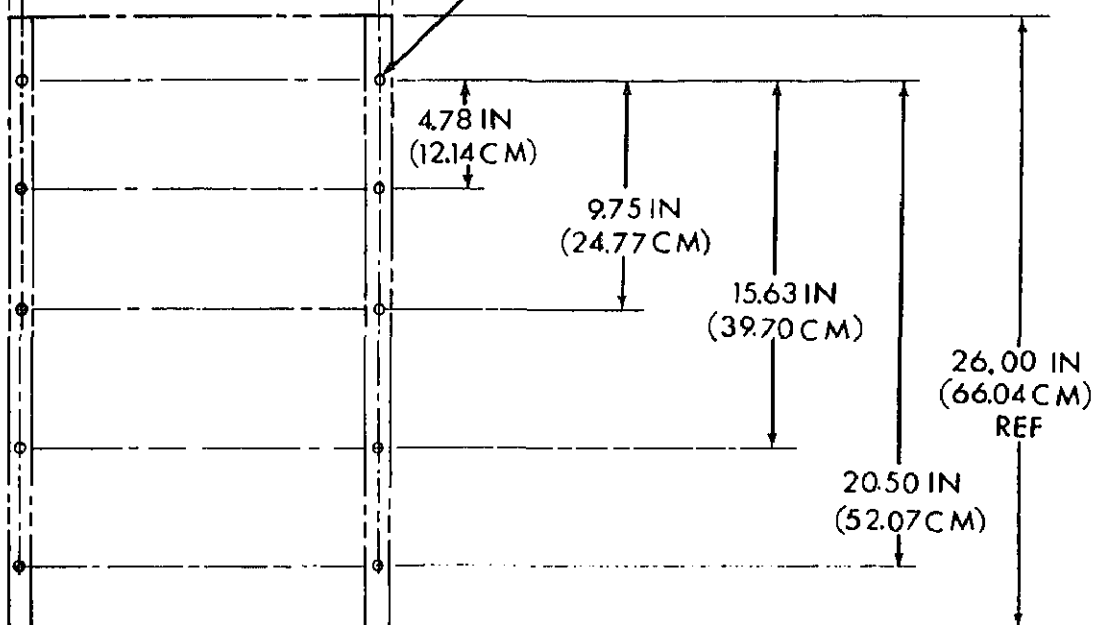
Two drain connections are located on the evaporator section drain pan. If the unit is placed so that drain lines are necessary, they are to be connected per the following instructions:

- (1) Connect a drain line to both drains if possible. If this is not possible connect to the lowest of the drains.
- (2) Use standard .25-18 NPT fittings to connect to the drains in the pan.
- (3) Using tubing, rigid pipe or hose, direct the condensate water to an existing drain, storm sewer or sump.

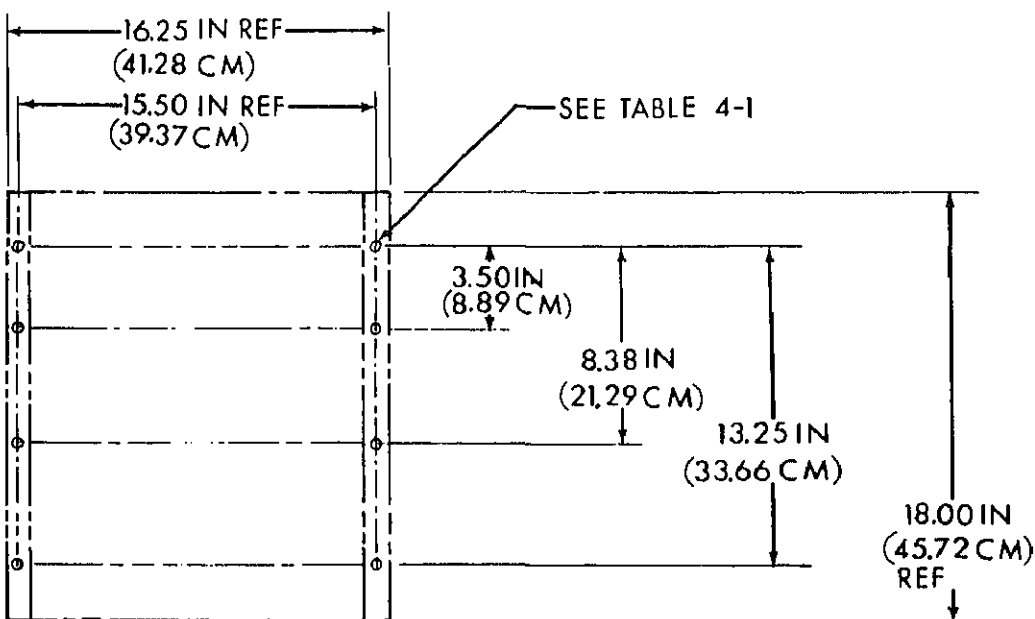
Connections between the condenser and evaporator sections.

- (1) Connect the larger refrigerant hose to the fittings marked S. Use two wrenches, one to hold the unit stationary, and the other to tighten the coupling to approximately 35 foot pounds (47.5 newton meters) of torque.





CONDENSER SECTION



EVAPORATOR SECTION

TS 4120-362-13/4-2

Figure 4-2. Wall Mounting Diagram.

- (2) Connect the smaller refrigerant hose to the fittings marked D, following the same instructions and cautions as connection of larger hose.

WARNING

EQUIPMENT DAMAGE

may be caused if unit is operated prior to opening of condenser receiver valve.

- (3) The receiver valve is located in the condenser section immediately behind the air intake grille (2-4.). Remove the valve stem cap to expose the stem. Turn this stem counterclockwise as far as it will go and replace and tighten cap. A slight hissing sound may be heard during this process as refrigerant is released from the tank into the system.
- (4) Connect the female end of the electrical cable to the receptacle marked L on the evaporator section. Connect the male end to the receptacle marked L on the condenser section.
- (5) Plug in the shorting plug which is chained to the connector on the condenser section at the rear of the hood.

CAUTION

Make sure power and power supply plug are compatible with the unit's requirements of a 4-wire system of two 115 volt ac lines, two common 0 volt lines of single phase 50/60 Hertz power.

NOTE

The shorting plug must be used when a time delay unit, for operation of two air conditioners, is not used.

- (6) Connect the 4-wire power supply cable female end to the receptacle marked P on the condenser section. The other end of the cable is connected to the power supply.

4-5. INITIAL ADJUSTMENTS AND CHECKS

- a. Perform the following preliminary checks:

- (1) Set Switch SW3 to VENT position.
- (2) Set Switch SW2 to ON.
- (3) Observe direction of evaporator fan rotation (the only fan that should be operating). Rotation should be counterclockwise when looking down into the evaporator section. See figure 2-4. Doubtful by noting that air is being discharged out of the four discharge air louvers just above the control panel. If rotation is clockwise, shut off power and check motor wiring.

- b. Check operation of controls as follows:

- (1) Set Switch SW2 to ON.

Turn Switch SW4 clockwise. The condenser fan and compressor should start. Check the condenser rotation. It should be counterclockwise when seen through the rear of the condenser section. See 2-5.

ve the sight glass. It should be clear and free of bubbles after 15 minutes of operation. If operation is not satisfactory, unit is ready for service. If any malfunction is noted, consult the troubleshooting section of this manual before performing steps again.

Section III.

PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

INTRODUCTION

The necessary preventive maintenance checks and services to be performed at the organizational level on a quarterly schedule are listed and described in Table 4-2.

They are arranged in a logical sequence as indicated by the item numbers. These numbers shall be used as a source of item numbers for the TM Number Column on DA Form 2404, Equipment Inspection and Maintenance Worksheet, in recording results of PMCS.

The Item to be Inspected column lists the part or group of parts to be checked and serviced. These items are identified in figures 4-3 and 4-4.

The Procedures column contains a brief description of the procedure by which the check is to be performed.

Electrical power should be disconnected from the air conditioner for all checks except the final functional check of the controls.

Section IV

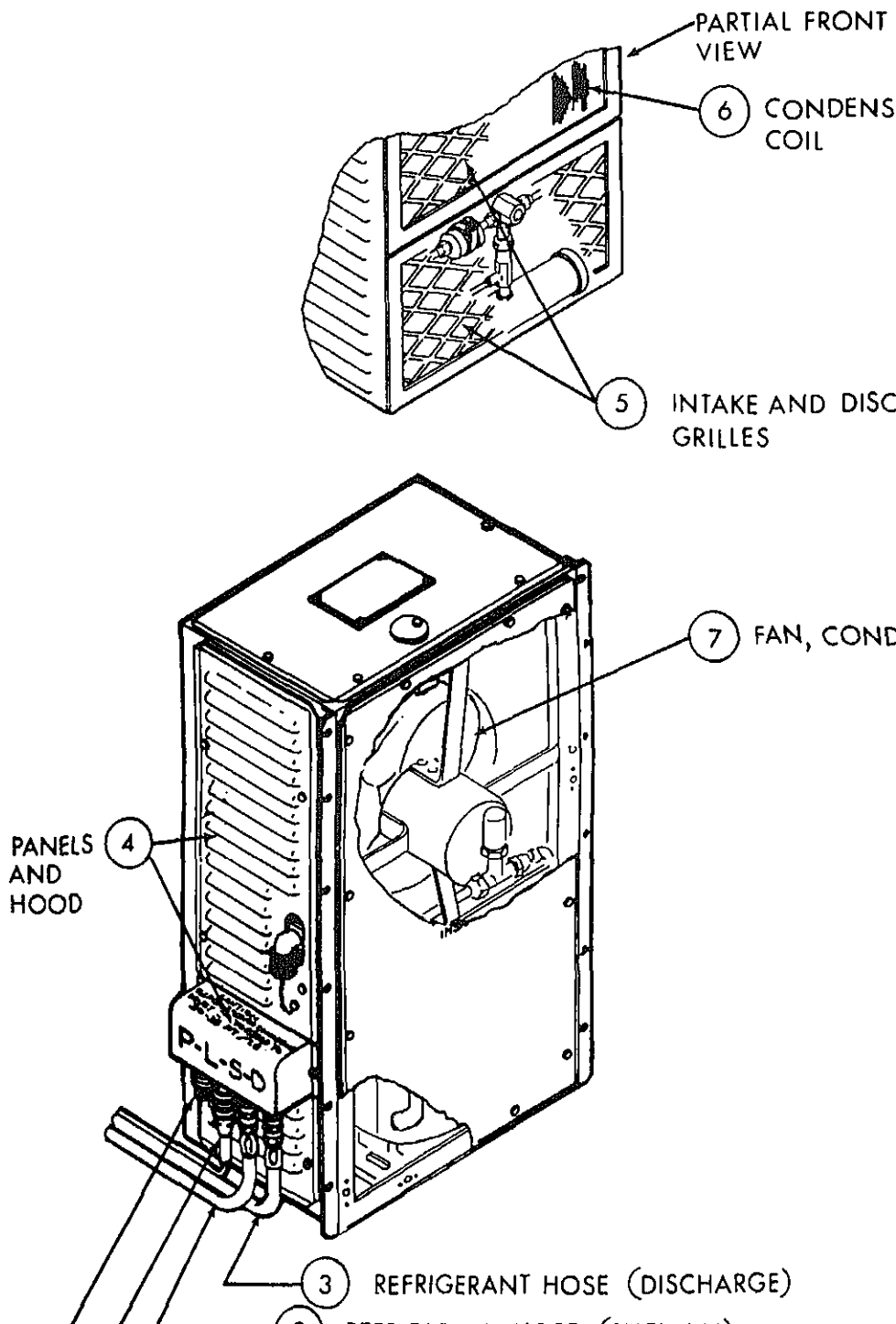
TROUBLESHOOTING

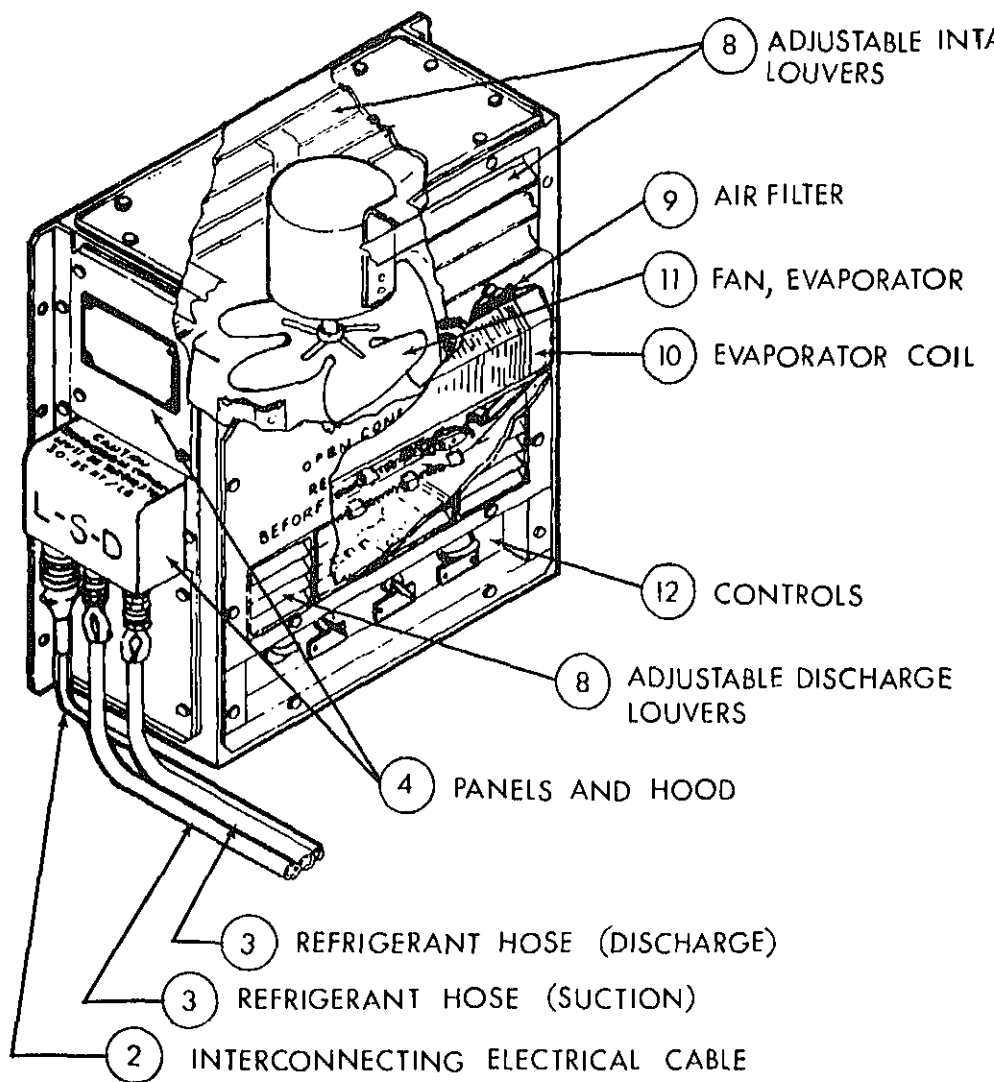
GENERAL

This Section contains troubleshooting information for locating and correcting most of the operational troubles which may develop in the air conditioner. Each malfunction for an individual component, subsystem or system is followed by a list of tests or inspections which will help you to determine corrective action to take. You should perform the tests/inspections and corrective actions in the order listed.

This manual cannot list all malfunctions that may occur, nor all tests or inspections and corrective actions. If a malfunction is not listed, or is not corrected by listed corrective actions, notify your supervisor.

Table 4-3 lists the common malfunctions which you may find during the operation or maintenance of the air conditioner or its components. You should perform the tests/inspections and corrective actions in the order listed.





WARNING

Disconnect power from the air conditioner.
The voltage used can be lethal.

Electrical power
supply cable and
connector
Interconnecting
electrical cable

Check cable for cuts, cracks and abrasions. Replace cable if defect is found that would expose copper conductor.

Check cable for cuts, cracks and abrasions. Replace cable if defect is found that would expose copper conductor.

Refrigerant hoses

Inspect hoses for signs of leakage, abrasion, kinking or wear. Refer to direct support maintenance for replacement.

Panels and hoods
(both sections)

Check for loose mounting hardware or damage. Tighten and repair or replace panels and hoods as necessary. Replace any missing or damaged mounting hardware.

Intake and
discharge grilles

CONDENSER SECTION

Inspect for obstructions, loose mounting hardware or damage. Repair or replace damaged grilles. Remove all obstructions and tighten mounting hardware.

Condenser Coil

Check for obstructions, damage, leaks and dirt. If damage or leaks are found, report defect to direct support maintenance. Remove obstructions and clean coil if necessary. Be careful not to damage fins. See paragraph 4-29 for specific cleaning instructions.

Fan, Condenser

Check for dirt, damage and abnormal vibration. See paragraph 4-15 for specific inspection, cleaning, repair and replacement procedures.

Adjustable Intake
and Discharge
Louvers

EVAPORATOR SECTION

Inspect for obstructions, ease of operation, loose mounting hardware and damaged or broken parts. See paragraph 4-37 for specific inspection, cleaning, repair, lubrication, repair and replacement procedures.

Air filter

Clean and service or replace if perforated, torn or otherwise damaged. See paragraph 4-45 for specific removal, inspection, cleaning, and reinstallation instructions.

		<p>NOTE</p> <p>Perform PMCS on evaporator coil before installing filter.</p>
0	Evaporator Coil	<p>Check for obstructions, damage, leaks and dirt. If damage or leaks are found, report defect to direct support maintenance. Remove obstructions and clean coil if necessary. Be careful not to damage fins. See paragraph 4-47 for specific cleaning instructions.</p>
1	Fan, Evaporator	<p>Check for dirt, damage and abnormal vibration. See paragraph 4-38 for specific inspection, cleaning, repair and replacement procedures.</p>
2	Controls	<p>Inspect controls for loose or broken knobs. Tighten or replace as necessary. Connect power to air conditioner. Check controls for proper operation. See paragraph 2-1. Should malfunction be noted, see Table 4-3, Troubleshooting Chart, and repair as indicated.</p>

*Service monthly or more often when required by operation under severe conditions.

NOTE

Before you use this Table, be sure you have performed all applicable operating checks.

TABLE 4-3 — TROUBLESHOOTING

FUNCTION TEST OR INSPECTION	CORRECTIVE ACTION
--------------------------------	-------------------

AIR CONDITIONER DOES NOT START

- Step 1.** Check to be sure main power cable is connected and that power is on.
Connect power cable and turn power on.
- Step 2.** Check to see that switch SW2 is in the ON position.
Turn switch SW2 to ON.
- Step 3.** Verify that pressure switch has not tripped.
Open pressure switch reset cover and press reset button.

WARNING

Disconnect power from the air conditioner before doing maintenance work on the electrical system. The voltage used can be lethal.

- Step 4.** Make sure that power supplied is compatible with unit's 4-wire, 115 V, single phase, 50/60 Hz requirement.

Check each wire of supply line with voltmeter per figure 4-7, Wiring Diagram.

Step 5. Inspect main power receptacle connector for defects.

Replace defective connector.

Step 6. Check for loose electrical connections.

Tighten all loose connections.

Step 7. Check fuse F1. Neon glow indicator lit indicates bad fuse.

Replace bad fuse. See para 4-14.

Step 8. Check rectifier CF1. See para 4-18. With 115 volts ac input, the output should be 103 volts.

Replace bad rectifier CF1.

2. EXCESSIVELY NOISY OPERATION

CAUTION

If knocking or hammering is heard when air conditioner is started up, shut down at once and report the condition to direct support maintenance. The compressor may be pumping liquid refrigerant, which will cause severe damage.

Step 1. Listen for knocking or hammering sounds.

Shut down and report to direct support maintenance.

Step 2. Check for defective compressor. See para 4-22.

Report to direct support maintenance.

Step 3. Check evaporator fan for looseness, vibration or interference. See para 4-38.

Tighten setscrews. Look for bent or broken blades that would cause an out-of-balance condition. Replace defective fan as necessary.

Step 4. Check condenser fan for looseness, vibration or interference. See para 4-15.

Tighten setscrews. Look for bent or broken blades that would cause an out-of-balance condition. Replace defective fan as necessary.

Step 5. Check evaporator fan motor for wear as indicated by noisy operation or excessive shaft end side-play.

Replace bearings or motor.

Step 6. Check condenser fan motor for wear as indicated by noisy operation or excessive shaft end side-play.

Replace bearings or motor.

EVAPORATOR FAN MOTOR DOES NOT START

Step 1. Make sure electrical power is supplied to motor.

Tighten connections or connect cable.

WARNING

Disconnect power from the air conditioner before doing maintenance work on the electrical system. The voltage used can be lethal.

Step 2. Check switch SW2 for defects (para 4-34).

Replace defective switch SW2.

Step 3. Check continuity of circuit between power supply and motor. See figure 4-7, Wiring Diagram.

Tighten loose connections. Repair or replace damaged wires.

Step 4. Check fan for freedom of rotation (para 4-38).

Relieve binding of fan blade.

Step 5. Check fan motor temperature.

Replace defective motor.

Step 6. Check for burned out fan motor (para 4-39).

Replace burned out fan motor.

Step 7. Check for defective power relay (para 4-41).

Replace defective power relay.

WIRING WRONG (Evaporator and Condenser)

Step 1. Check for wrong motor wiring. See Wiring Diagram, figure 4-7.

Make motor wiring corrections.

CONDENSER FAN MOTOR DOES NOT START

Step 1. Make sure electrical power is supplied to motor.

Tighten connections or connect cable.

WARNING

Disconnect power from the air conditioner before doing maintenance work on the electrical system. The voltage used can be lethal.

Step 2. Check whether switch SW3 is on COOL.

Place switch SW3 in COOL position.

Step 3. Check whether switch SW4 is set in low enough temperature.

Set switch SW4 on COOL.

Step 4. Check for defective power relay (para 4-41).

Replace defective power relay.

Step 5. Check selector switch SW3 for defects. See paragraph 4-35.

Replace defective switch SW3.

Step 6. Check fan for freedom of rotation. See paragraph 4-15.

Relieve binding.

Step 7. Check fan motor temperature.

Replace defective motor.

Step 8. Check for burned out fan motor. See paragraph 4-16.

Replace burned out fan motor.

INSUFFICIENT COOLING

Step 1. Check for closed receiver valve.

Open receiver valve.

Step 2. Check evaporator air intake and outlet louvers to make sure they are open, not obstructed, and able to provide adequate air output.

Open louvers or remove obstruction.

Step 3. Test evaporator fan motor for defects. See paragraph 4-39.

Replace evaporator motor.

Step 4. Test compressor for defects. See paragraph 4-22.

Report to direct support maintenance.

Step 5. Check thermostat for defects. See paragraph 4-36.

Replace defective thermostat.

Step 6. Check sight glass liquid indicator for bubbles. If bubbles exist, check for leaks. See Table item 5.

Report to direct support maintenance.

Step 7. Check for clogged filter-drier. Feel filter-drier for temperature difference. Discharge or either feel cooler than input end if clogged, or may be sweaty or frosty.

Report to direct support maintenance.

7. EVAPORATOR AIR OUTPUT VOLUME INSUFFICIENT

Step 1. Inspect filter for dirt and clogging. See paragraph 4-45.

Clean or replace filter.

WARNING

Disconnect power from the air conditioner before doing maintenance work on the internal parts. The voltage used can be lethal.

Step 2. Evaporator fan loose, binding or damaged.

Tighten setscrews or relieve binding as necessary. Replace damaged fan.

Step 3. Check evaporator fan motor for operation. See paragraph 4-39.

Replace evaporator fan motor.

Step 4. Check evaporator coil for dirt.

Clean evaporator coil. See paragraph 4-47.

Step 5. Check evaporator coil for iced-up condition. If icing is found, it will usually indicate a low load, thermostat is set too low, air flow is blocked or a low refrigerant charge.

CAUTION

Do not use steam, open flame, heat gun or any other high-temperature heat source to thaw an iced coil.

Thaw an iced coil with a lamp bulb (75-watt maximum), hair drier, electric fan or by leaving the unit shut down until ice melts. If condition reoccurs report to direct support maintenance.

8. HEATER FAILS TO OPERATE WHEN EVAPORATOR FAN OPERATES

Step 1. Check if switch SW3 is in HEAT position.

Place switch SW3 in HEAT position.

Step 2. Check if switch SW4 is not set at high enough temperature.

Turn switch SW4 counterclockwise.

Step 3. Inspect power relay K4 for breaks, cracks, corrosion, rust and loose electrical connections. Check continuity of pins 6 and 7 after relay is removed from socket.

Replace defective relay.

Step 4. Check if heating coil elements are burned out.

Replace heating coil element (para 4-46).

COMPRESSOR FAILS TO OPERATE

- Step 1.* Make sure switch SW3 is set on COOL.
Place switch SW3 in COOL position.
- Step 2.* Check if switch SW4 is not set at low enough temperature.
Turn switch SW4 clockwise.
- Step 3.* Check for loose connections in wiring.
Tighten loose connections.
- Step 4.* Inspect power relay K4 for breaks, cracks, corrosion, rust and loose electrical connections.
check continuity of pins 6 and 7 after relay is removed from socket.
Replace defective relay.
- Step 5.* Check for defective selector switch SW3.
Replace defective selector switch SW3 (para 4-35).
- Step 6.* Check for defective compressor (para 4-22).
Report to direct support maintenance.

COOLING EXCESSIVELY IN COOLING MODE

- Step 1.* Check for defective thermostatic expansion valve.
Report to direct support maintenance.
- Step 2.* Inspect power relay K4 for breaks, cracks, corrosion, rust and loose electrical connections.
check continuity of pins 6 and 7.
Replace defective power relay K4.
- Step 3.* Check thermostat control S4 for defects.
Replace defective thermostat control S4.

LOUVERS FAIL TO OPERATE

- Step 1.* Check linkage for possible binding.
Straighten linkage.
- Step 2.* Check for defective control.
Replace control (para 4-37).
- Step 3.* Check for defective louver.
Replace louver.
- Step 4.* Check for foreign object in louver blades.
Remove foreign object from louver blades.

Section V

MAINTENANCE PROCEDURES

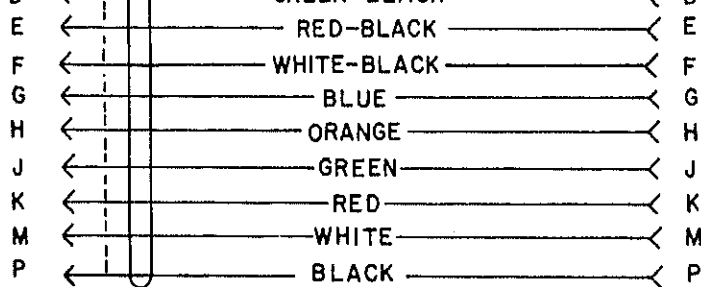
INTERCONNECTING CABLE ASSEMBLY

(figure 4-5).

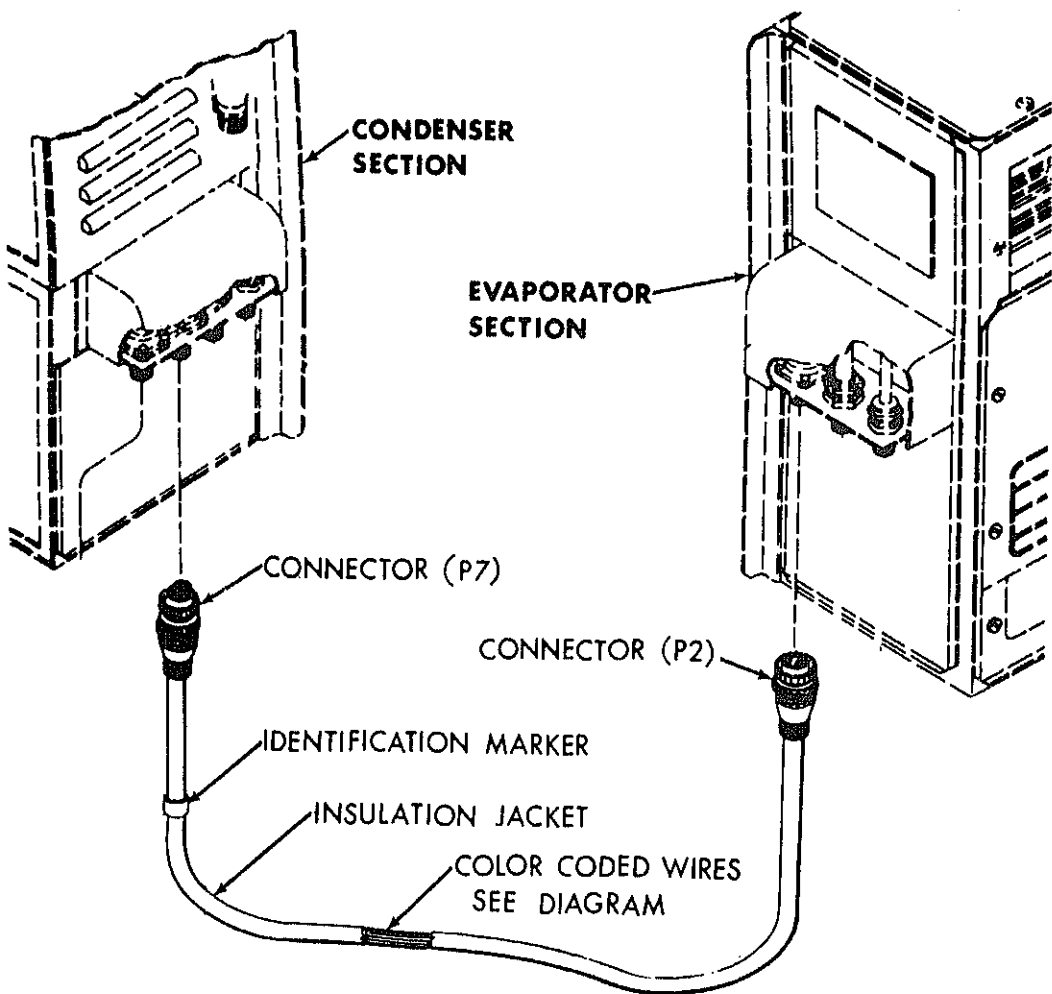
WARNING

Disconnect power from the air conditioner before performing maintenance on electrical components. The voltage used can be lethal.

Removal. Unscrew both connectors and remove the interconnecting cable assembly.



SCHEMATIC DIAGRAM



TS 4120-362-13/4-5

Figure 4-5. Interconnecting Cable.

Check individual wires for loose solder connections or damaged wires. Repair solder connections and replace damaged wires.

Testing. Using wiring diagram in figure 4-5, check individual wires for continuity. If continuity is indicated, check solder connections and replace all damaged wires.

Repair. When repairing solder joints, wire connections must be made mechanically sound before being soldered; solder alone does not provide sufficient strength to prevent breakage. Surfaces of components to be soldered must be clean and bright. If a separate flux is used, it should conform to Specification MIL-F-4995, Type I, resin-alcohol flux, and should be brushed onto the joint before soldering. If a tin-lead solder is used, it should always be resin-core electrical solder. If an uncured solder is used, it should be a lead-tin solder conforming to Specification QQ-S-571. Wires should always be heated to the point at which the solder will melt completely and flow into all parts of the joint. Excessive buildup of solder in the joint should be avoided or removed.

Installation. Screw connector P2 to the connection point marked L on the evaporator section. Screw connector P7 to the connection point marked L on the condenser section. Make sure they are tight.

REFRIGERANT HOSES

(figure 4-6).

Inspection/test-installed. Check hose ends and fittings for cracks, breaks and other obvious defects. Check hose for abrasions, cuts and cracks. Inspect hose assemblies and fittings for any indication of refrigerant leakage. If leakage is indicated, test by one of the following methods:

CAUTION

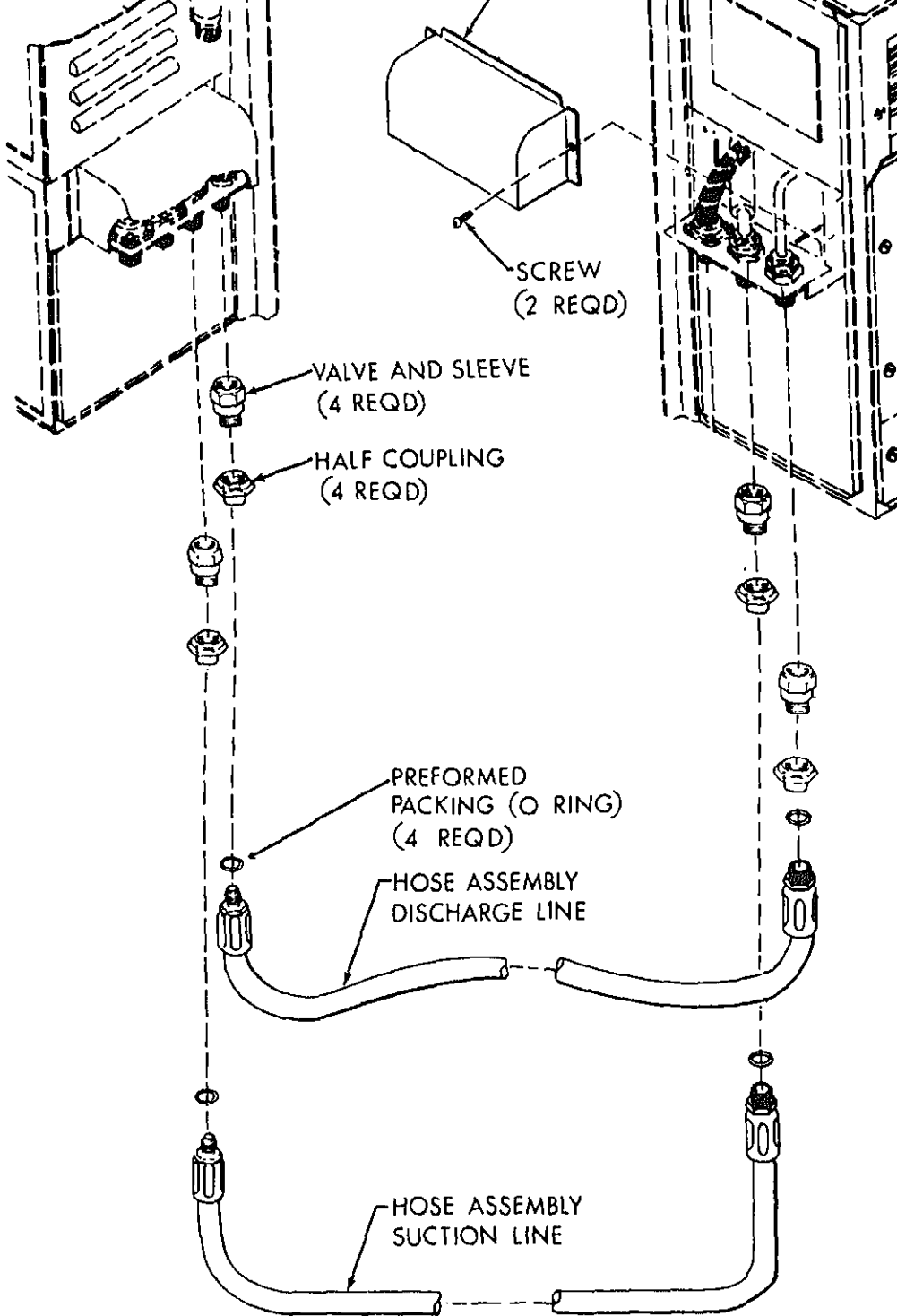
The electronic leak detector is sensitive to the presence of refrigerant gas in the atmosphere. When refrigerant gas is present in the atmosphere of work area, false indications can result. Use in a well ventilated but draft-free area.

- Electronic Leak Detector. Turn the electronic unit on, and slowly pass the probe around all points of the refrigeration system at which a leak could exist. Depending upon the type of detector used, a leak will be indicated by an audible signal, a light, or by meter deflections.
- Soap Solution. Brush soap solution on all possible points of leakage, and watch for bubbles. Follow a definite sequence to avoid missing any points that should be tested. Wipe the solution from the joints, and mark any point at which a leak is found.

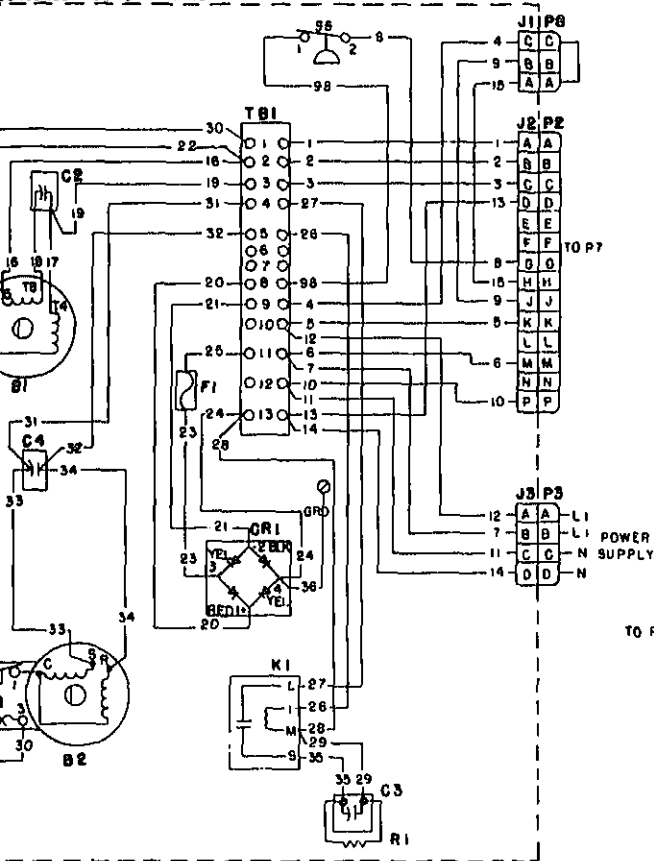
Replacement. If inspection/test results show any of the above defects, report to direct support maintenance for hose removal and replacement.

ELECTRICAL CONNECTOR (POWER SUPPLY)

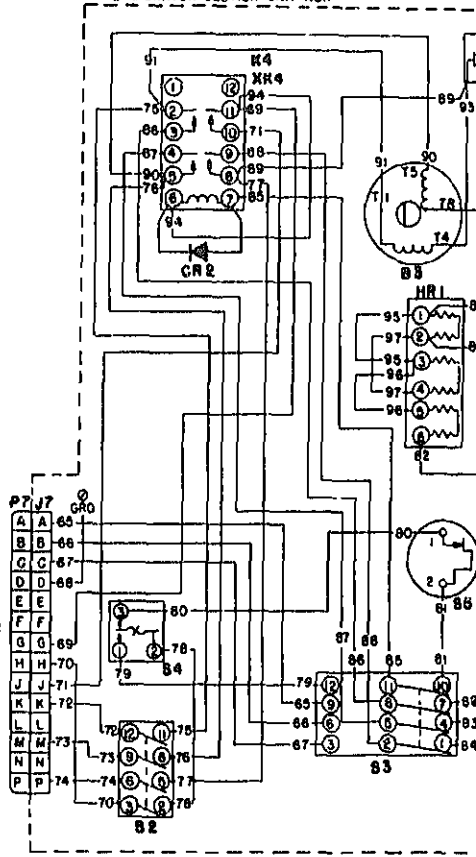
The connector is supplied as original equipment with the air conditioner. The connecting cable and end connections to power source may vary since this is installed by the user. See wiring diagram, figure 4-7 and location, figure 4-3 for location.



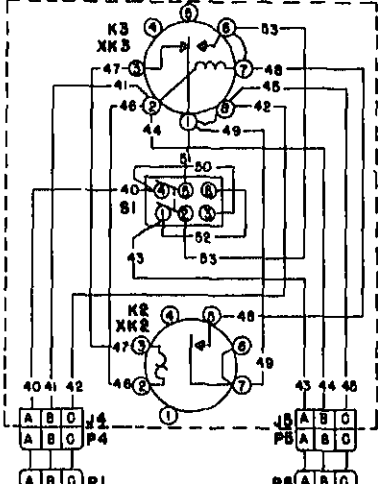
CONDENSER SECTION UNIT NO.1



EVAPORATOR SECTION UNIT NO.1



TIME DELAY UNIT



LEGEND			
SYM	DESCRIPTION	SYM	DESCRIPTION
B1	MOTOR	P1	CONNECTOR
B2	COMPRESSOR	P2	CONNECTOR
B3	MOTOR	P3	CONNECTOR
C1	CAPACITOR, MOTOR RUN	P4	CONNECTOR
C2	CAPACITOR, MOTOR RUN	P5	CONNECTOR
C3	CAPACITOR	P6	CONNECTOR
C4	CAPACITOR	P7	CONNECTOR
C5	CAPACITOR	P8	SHORTING PLUG
C6	CAPACITOR	S1	SWITCH, TOGGLE
C7	CAPACITOR	S2	SWITCH, TOGGLE
C8	CAPACITOR	S3	SWITCH, TOGGLE
C9	CAPACITOR	S4	SWITCH, TOGGLE
C10	CAPACITOR	S5	SWITCH, TOGGLE
C11	CAPACITOR	S6	SWITCH, TOGGLE
C12	CAPACITOR	S7	SWITCH, TOGGLE
C13	CAPACITOR	S8	SWITCH, TOGGLE
C14	CAPACITOR	S9	SWITCH, TOGGLE
C15	CAPACITOR	S10	SWITCH, TOGGLE
C16	CAPACITOR	S11	SWITCH, TOGGLE
C17	CAPACITOR	S12	SWITCH, TOGGLE
C18	CAPACITOR	S13	SWITCH, TOGGLE
C19	CAPACITOR	S14	SWITCH, TOGGLE
C20	CAPACITOR	S15	SWITCH, TOGGLE
C21	CAPACITOR	S16	SWITCH, TOGGLE
C22	CAPACITOR	S17	SWITCH, TOGGLE
C23	CAPACITOR	S18	SWITCH, TOGGLE
C24	CAPACITOR	S19	SWITCH, TOGGLE
C25	CAPACITOR	S20	SWITCH, TOGGLE
C26	CAPACITOR	S21	SWITCH, TOGGLE
C27	CAPACITOR	S22	SWITCH, TOGGLE
C28	CAPACITOR	S23	SWITCH, TOGGLE
C29	CAPACITOR	S24	SWITCH, TOGGLE
C30	CAPACITOR	S25	SWITCH, TOGGLE
C31	CAPACITOR	S26	SWITCH, TOGGLE
C32	CAPACITOR	S27	SWITCH, TOGGLE
C33	CAPACITOR	S28	SWITCH, TOGGLE
C34	CAPACITOR	S29	SWITCH, TOGGLE
C35	CAPACITOR	S30	SWITCH, TOGGLE
C36	CAPACITOR	S31	SWITCH, TOGGLE
C37	CAPACITOR	S32	SWITCH, TOGGLE
C38	CAPACITOR	S33	SWITCH, TOGGLE
C39	CAPACITOR	S34	SWITCH, TOGGLE
C40	CAPACITOR	S35	SWITCH, TOGGLE
C41	CAPACITOR	S36	SWITCH, TOGGLE
C42	CAPACITOR	S37	SWITCH, TOGGLE
C43	CAPACITOR	S38	SWITCH, TOGGLE
C44	CAPACITOR	S39	SWITCH, TOGGLE
C45	CAPACITOR	S40	SWITCH, TOGGLE
C46	CAPACITOR	S41	SWITCH, TOGGLE
C47	CAPACITOR	S42	SWITCH, TOGGLE
C48	CAPACITOR	S43	SWITCH, TOGGLE
C49	CAPACITOR	S44	SWITCH, TOGGLE
C50	CAPACITOR	S45	SWITCH, TOGGLE
C51	CAPACITOR	S46	SWITCH, TOGGLE
C52	CAPACITOR	S47	SWITCH, TOGGLE
C53	CAPACITOR	S48	SWITCH, TOGGLE
C54	CAPACITOR	S49	SWITCH, TOGGLE
C55	CAPACITOR	S50	SWITCH, TOGGLE
C56	CAPACITOR	S51	SWITCH, TOGGLE
C57	CAPACITOR	S52	SWITCH, TOGGLE
C58	CAPACITOR	S53	SWITCH, TOGGLE
C59	CAPACITOR	S54	SWITCH, TOGGLE
C60	CAPACITOR	S55	SWITCH, TOGGLE
C61	CAPACITOR	S56	SWITCH, TOGGLE
C62	CAPACITOR	S57	SWITCH, TOGGLE
C63	CAPACITOR	S58	SWITCH, TOGGLE
C64	CAPACITOR	S59	SWITCH, TOGGLE
C65	CAPACITOR	S60	SWITCH, TOGGLE
C66	CAPACITOR	S61	SWITCH, TOGGLE
C67	CAPACITOR	S62	SWITCH, TOGGLE
C68	CAPACITOR	S63	SWITCH, TOGGLE
C69	CAPACITOR	S64	SWITCH, TOGGLE
C70	CAPACITOR	S65	SWITCH, TOGGLE
C71	CAPACITOR	S66	SWITCH, TOGGLE
C72	CAPACITOR	S67	SWITCH, TOGGLE
C73	CAPACITOR	S68	SWITCH, TOGGLE
C74	CAPACITOR	S69	SWITCH, TOGGLE
C75	CAPACITOR	S70	SWITCH, TOGGLE
C76	CAPACITOR	S71	SWITCH, TOGGLE
C77	CAPACITOR	S72	SWITCH, TOGGLE
C78	CAPACITOR	S73	SWITCH, TOGGLE
C79	CAPACITOR	S74	SWITCH, TOGGLE
C80	CAPACITOR	S75	SWITCH, TOGGLE
C81	CAPACITOR	S76	SWITCH, TOGGLE
C82	CAPACITOR	S77	SWITCH, TOGGLE
C83	CAPACITOR	S78	SWITCH, TOGGLE
C84	CAPACITOR	S79	SWITCH, TOGGLE
C85	CAPACITOR	S80	SWITCH, TOGGLE
C86	CAPACITOR	S81	SWITCH, TOGGLE
C87	CAPACITOR	S82	SWITCH, TOGGLE
C88	CAPACITOR	S83	SWITCH, TOGGLE
C89	CAPACITOR	S84	SWITCH, TOGGLE
C90	CAPACITOR	S85	SWITCH, TOGGLE
C91	CAPACITOR	S86	SWITCH, TOGGLE
C92	CAPACITOR	S87	SWITCH, TOGGLE
C93	CAPACITOR	S88	SWITCH, TOGGLE
C94	CAPACITOR	S89	SWITCH, TOGGLE
C95	CAPACITOR	S90	SWITCH, TOGGLE
C96	CAPACITOR	S91	SWITCH, TOGGLE
C97	CAPACITOR	S92	SWITCH, TOGGLE
C98	CAPACITOR	S93	SWITCH, TOGGLE
C99	CAPACITOR	S94	SWITCH, TOGGLE
C100	CAPACITOR	S95	SWITCH, TOGGLE

TIME DELAY UNIT REQUIRED TO
OPERATE TWO AIR CONDITIONERS.
PROCEDURE FOR CONNECTING SECOND
CONDITIONER:
REMOVE P8 FROM CONDENSER SECTIONS
CONNECT P1 TO J1 OF FIRST AIR
CONDITIONER.
CONNECT P6 TO J1 OF SECOND AIR
CONDITIONER.

Removal. Unscrew the connector and remove from the condenser section.

Inspection. Inspect for damage and loose or broken pins. Replace if defective.

Installation. Screw the connector to the connection point marked P on the condenser section.

11. PANELS, GRILLES AND HOOD (CONDENSER SECTION) (figures 4-8 and 4-9).

Description. The condenser section is housed within metal panels, fixed louvered panels and grille. Quick release 1/4 turn stud fasteners permit easy removal of panels and grilles except the discharge grille, access cover and hood. The discharge air grille and the hood are retained by standard machine screws.

Removal. Remove the panels, louvered panels and grilles that have quick release 1/4 turn stud fasteners by turning the fasteners 1/4 turn counterclockwise and pulling the panel, louvered panel or grille forward. Remove the screws that retain the discharge grille and the hood.

WARNING

Dry cleaning solvent (Fed Spec P-D-680) used to clean parts is potentially dangerous to personnel and property. Do not use near open flame or excessive heat. Flash point of solvent is 100°F to 138°F (38°C to 59°C).

c. Cleaning. Clean the panels, louvers and grilles with a cloth dampened with a detergent solution or cleaning solvent (Fed Spec P-D-680). Use a soft brush if necessary to dislodge caked on dirt. Clean items thoroughly.

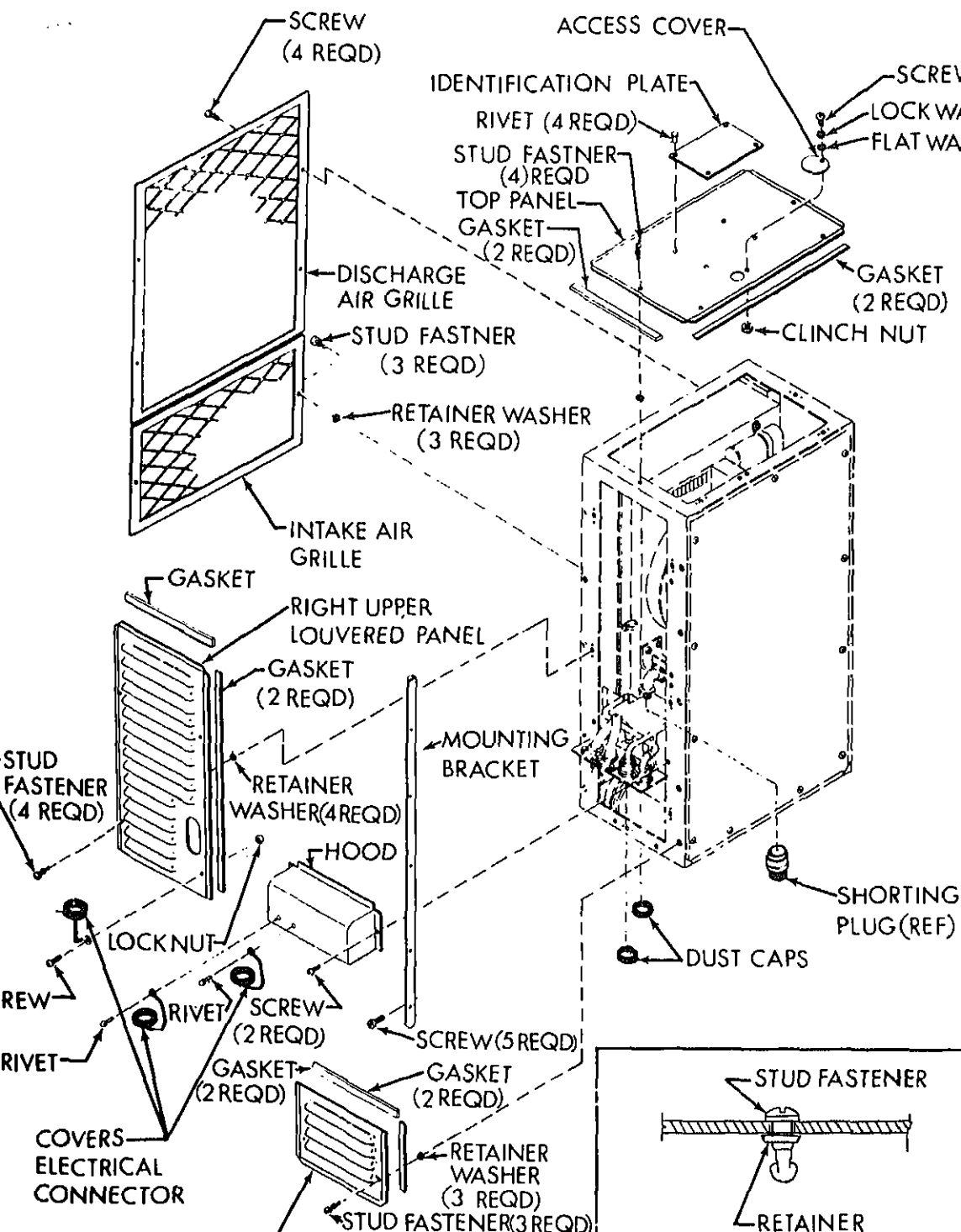
d. Inspection/Repair. Inspect panels, louvers and grilles for breaks, cracks, dents, loose or missing mounting hardware or other defects. Repair breaks, cracks, and dents using conventional sheet metal methods. Replace missing mounting hardware and panels damaged beyond repair. Inspect the identification plate riveted to the outside of the top panel and the wiring diagram plate riveted to the inside of the rear panel for legibility and obvious damage. Replace if you cannot read all of the information on the plate. Inspect gasket material for hardening, permanent set, cuts, tears or missing pieces. If necessary to replace gasket material, use the following procedure:

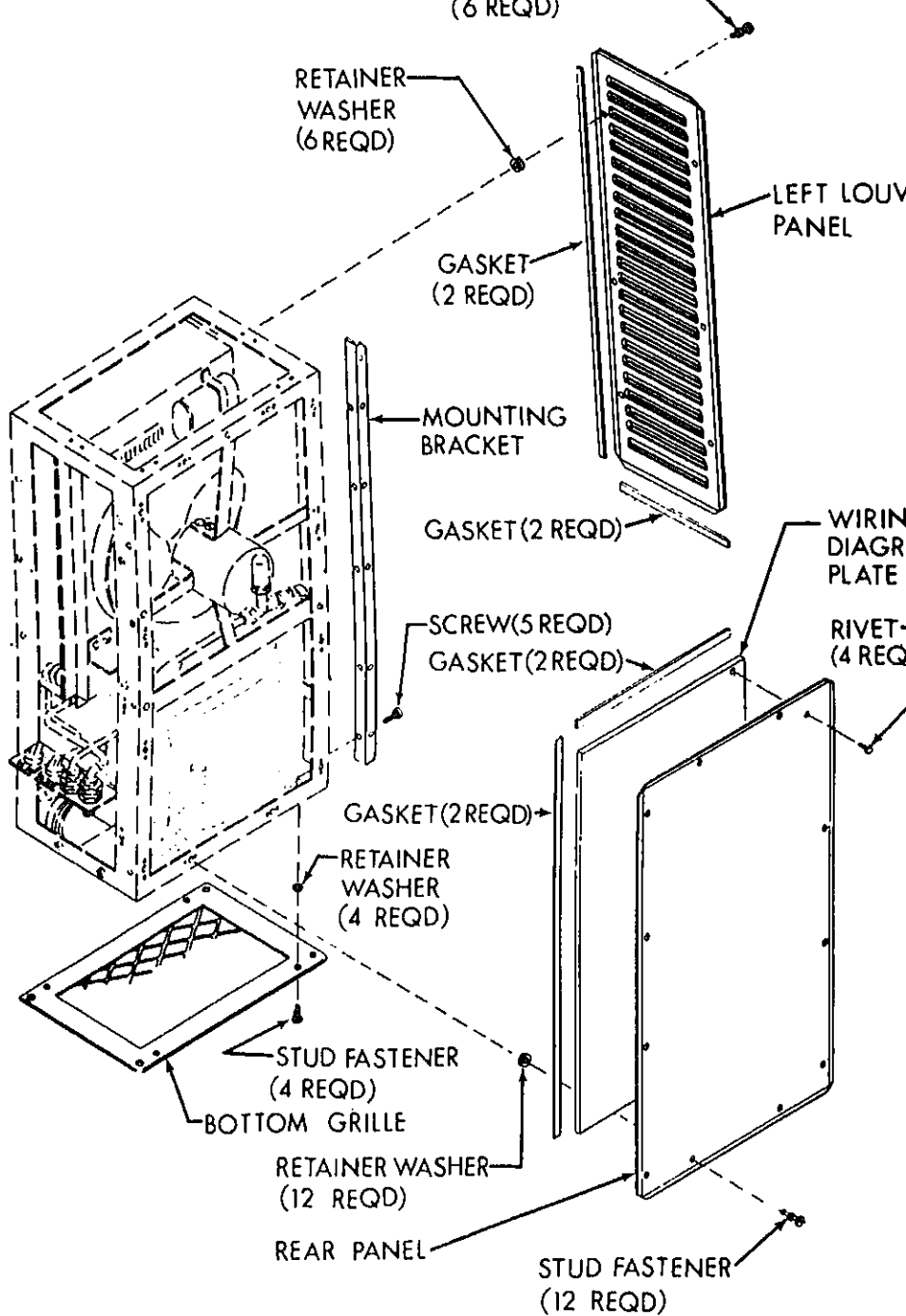
- (1) Remove as much old gasket material as possible by pulling or scraping it away from the surface.

WARNING

Acetone and methyl-ethyl ketone (MEK) are flammable, and their vapors can be explosive. Repeated or prolonged skin contact or inhalation of vapors can be toxic. Use in a well-ventilated area, wear gloves, and keep away from sparks or flame.

- (2) Soften and remove old adhesive and gasket residue, using acetone or methyl-ethyl ketone and a stiff brush.





Installation.

- Access cover. Install on top panel using a screw, lock washer and flat washer. A retained nut is provided in the top panel to retain this hardware. Tighten so that access cover can be moved without loosening the screw with a screw driver.
- Identification plate and wiring diagram plate. If these plates were removed, reinstall with rivets.
- If electrical connector covers were removed, reinstall with screw and nut or rivets.
- Attach the hood and discharge air grille with screws.
- See the typical stud fastener installation detail on figure 4-8 for installation of any missing stud fasteners.
- Position the remaining panels and grilles and engage the 1/4 turn stud fasteners.

CONNECTOR ELECTRICAL (SHORTING PLUG)

(figure 4-7).

Description. The shorting plug is used for single unit installations. See the wiring diagram (figure 4-7) for further information. The shorting plug is P8 on the wiring diagram.

Removal. The shorting plug is located on the right side of the condenser section (figure 4-8). Unscrew the connector protective cover. Remove shorting plug.

Test. Check for continuity between pins A and C. If continuity is not indicated, check solder connections and condition of wire. Repair bad solder connections and replace jumper wire if it is damaged.

Repair. During repair of solder joints, wire connections must be made mechanically sound before soldering; solder alone does not provide sufficient strength to prevent breakage. Surfaces of components to be soldered must be clean and bright. If a separate flux is used, it should conform to Specification MIL-F-4995, Type I, resin-alcohol flux, and should be brushed onto the joint before soldering. If a prefluxed wire solder is used, it should always be resin-core electrical solder. If an uncored solder is used, it should be a lead-tin solder conforming to Specification QQ-S-571. Wires should always be heated to the point at which the solder will melt completely and flow into all parts of the joint. Excessive buildup of solder on the joint should be avoided or removed.

Installation. Screw shorting plug to elbow connector on the right side of the condenser section. Make sure it is tight. Screw the connector protective cover back in place.

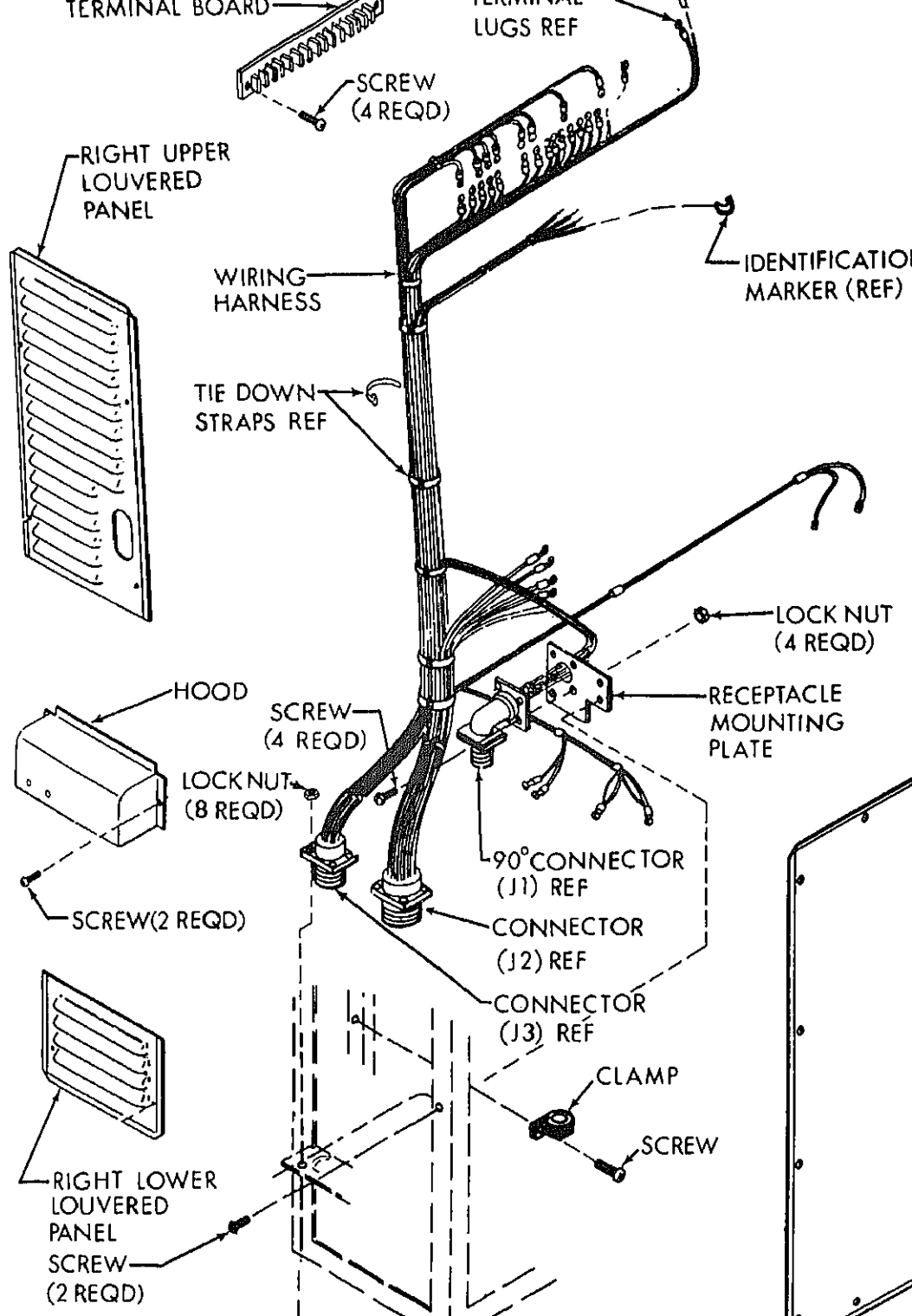
ELECTRICAL WIRING (CONDENSER SECTION)

(Figure 4-10).

WARNING

Disconnect power from the air conditioner before performing maintenance on electrical components. The voltage used can be lethal.

Access. Remove the following outside panels.



Inspect connectors for damage and loose or broken pins. Replace if defective.

Check individual wires for loose solder connections, loose terminal lugs, cut or frayed insulation, cut or broken wires. Repair or replace if defective.

Check terminal board for cracks and breaks. Replace if defective.

ing. Using wiring diagram in figure 4-5, check individual wires for continuity. If continuity is not indicated, check solder and terminal lug connections and condition of wire. Repair all bad solder connections and replace all damaged wires.

air or Replace. Preferred repair methods consist of replacing wires, terminals, connectors, etc., rather than splicing wires, bending ends to form terminals, and other makeshift procedures, although the latter may be appropriate for emergency field repairs. Determine the proper size and length of wire, terminal or connector to be used for replacement by referring to Table 4-4, Wire List, and to the wiring diagram (figure 4-7).

Soldering Connections. Wire connections must be made mechanically sound before they are soldered; solder alone does not provide sufficient strength to prevent breakage. Joining surfaces for connections to be soldered must be clean and bright. If a separate flux is used, it should conform to Specification MIL-F-4995, Type I, resin-alcohol flux, and should be brushed onto the joint before soldering. If a flux-core solder is used, it should always be resin-core electrical solder. If an uncored solder is used, it should be a lead-tin solder conforming to Specification QQ-S-571. Wires should always be heated to the point at which the solder will melt completely and flow into all parts of the joint. Excessive buildup of solder globs on the joint should be avoided or removed.

TABLE 4-4 WIRE LIST CONDENSER SECTION

Ident. No. (Marketing)	TERMINATION		TERMINATION		Awg Wire Size
	From	Terminal Type	To	Terminal Type	
WIRING HARNESS CONDENSER SECTION					
1	TB1-1	MS25036-106	J2-A	MS3102R22-19S	16
2	TB1-2	MS25036-106	J2-B	MS3102R22-19S	16
3	TB1-3	MS25036-106	J2-C	MS3102R22-19S	16
4	TB1-9	MS25036-106	J1-C	13211E4742 (97403)	16
5	TB1-10	MS25036-106	J2-K	MS3102R22-19S	16
6	TB1-11	MS25036-106	J2-M	MS3102R22-19S	16
7	TB1-11	MS25036-106	J3-B	MS3102R18-4P	16
8	S6-2	41532 (00779)	J2-G	MS3102R22-19S	16
9	J1-B	13211E4742 (97403)	J2-J	MS3102R22-19S	16
10	TB1-12	MS25036-106	J2-P	MS3102R22-19S	16
11	TB1-12	MS25036-106	J3-C	MS3102R18-4P	16
12	TB1-10	MS25036-106	J3-A	MS3102R18-4P	16
13	TB1-13	MS25036-106	J2-D	MS3102R22-19S	16
14	TB1-13	MS25036-106	J3-D	MS3102R18-4P	16
15	J2-H	MS3102R22-19S	J1-A	13211E4742 (97403)	16
19	C2	41532 (00779)	TB1-3	MS25036-106	16
20	CR1-1	—	TB1-8	MS25036-106	16
21	CR1-2	—	TB1-9	MS25036-106	16
24	CR1-4	—	TB1-13	MS25036-106	16
25	F1	—	TB1-11	MS25036-106	16

Ident. No. (Marking)	TERMINATION		TERMINATION		Awg Wire Size
	From	Terminal Type	To	Terminal Type	
			WIRING HARNESS CONDENSER SECTION (Continued)		
26	K1-J	41532 (00779)	TB1-5	MS25036-106	16
27	K1-L	41532 (00779)	TB1-4	MS25036-106	16
28	K1-M	41532 (00779)	TB1-13	MS25036-106	16
29	K1-M	41532 (00779)	C3	41532 (00779)	16
30	B2-3	MS25036-106	TB1-1	MS25036-106	16
31	B2-R	41532 (00779)	TB1-5	MS25036-106	16
32	B2-S	41532 (00779)	TB1-4	NS25036-106	16
33	C4	41532 (00779)	B2-S	41532 (00779)	16
34	C4	41532 (00779)	B2-R	41532 (00779)	16
35	K1-S	41532 (00779)	C3	41532 (00779)	16
98	S6-1	41532 (00779)	TB1-8	MS25036-106	16
			LOOSE WIRE CONDENSER SECTION		
36	CR1-4	—	GRD	MS25036-153	16

covering joints. To cover a joint, cut a piece of tubing long enough to cover the joint to be insulated, and slide the tubing over the wire before making the joint. After the joint is made, slide the tubing over the joint, and shrink in place with moderate heat.

- (3) **Splicing Wires.** To repair broken or cut wires that are otherwise sound, the mating ends must be stripped, twisted, and spliced. A commercial butt splice can be crimped onto the ends to join them. A Union wire splice can be made. The latter is made by stripping 1-1/4 inch (3.18 cm) of insulation from each of the wire ends, holding the ends parallel and facing opposite directions, then twisting the wire ends around the other wire at least three turns. Solder and apply insulation as described.
- (4) **Crimping Terminals.** To install a terminal on the end of a wire, strip 1/4 to 1/2 inch (0.6 to 1.3 cm) of insulation from the end of the wire, apply a one-inch (2.54 cm) piece of heat-shrink tubing to the wire, and insert wire-end into the shank of the terminal. Crimp the wire into the terminal and install heat-shrink tubing if necessary.

e. **Reassembly.** Reinstall the following outside panels.

- (1) Attach the hood with two machine screws.
- (2) Reinstall the right upper louvered panel, the right lower louvered panel and the rear panel. Tighten the panel and engaging the 1/4 turn stud fasteners.

4-14. FUSE (CONDENSER SECTION)

- a. **Inspection of installed items** (figure 4-11). The circuit from the power supply connector to the condenser section contains fuse F1.
 - (1) Remove rear panel from condenser section.
 - (2) Observe indicator cap on fuse holder. If this fuse is burned out, the cap which contains the indicator will light until the defective fuse is replaced.

WARNING

Disconnect power from the air conditioner before performing maintenance on electrical components. The voltage used can be lethal.

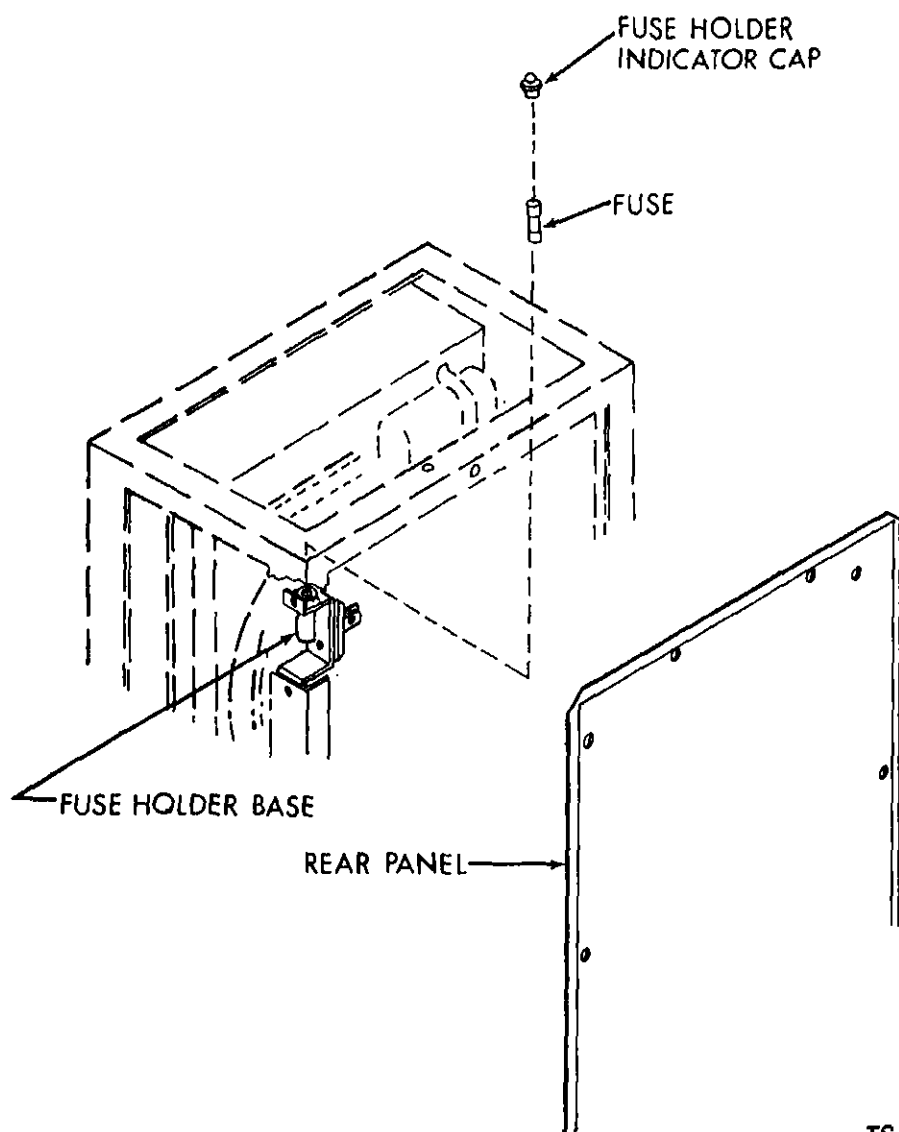
b. **Removal.**

- (1) Disconnect power.
- (2) Push in on indicator cap, turn counterclockwise and remove cap.
- (3) Remove fuse and check for melted or broken element. If the fuse is defective, replace fuse.

c. **Installation.**

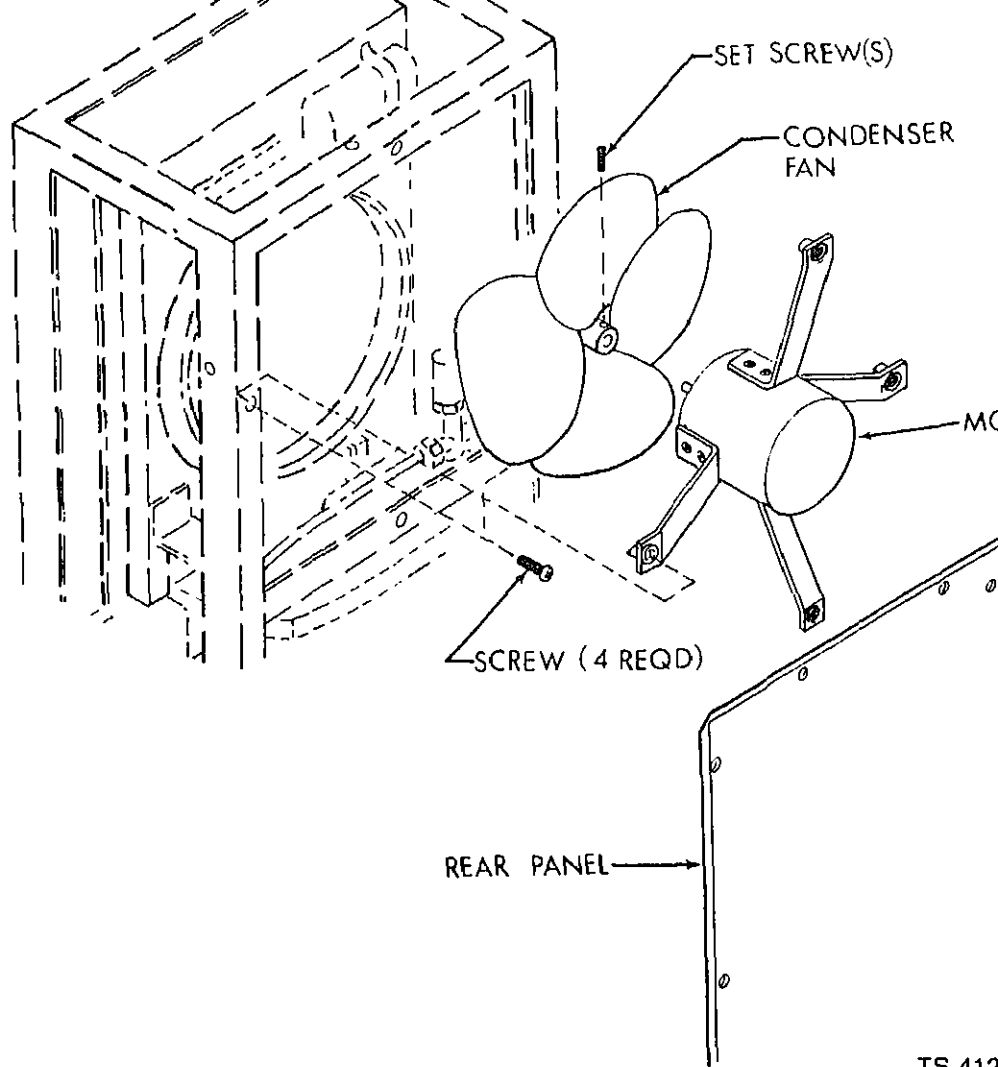
- (1) Place fuse in fuse holder.
- (2) Replace indicator cap.

- (4) Observe indicator cap. If fuse is good, the lamp in the cap will not light.
- (5) Install the rear panel.



TS 4120-362-18/4.

Figure 4-11. Fuse, Condenser Section.



TS 412

Figure 4-12. Condenser Fan.

WARNING

Disconnect power from the air conditioner before performing maintenance on components. The voltage used can be lethal.

- (1) Disconnect power.
- (2) Remove the rear panel.

Warning.

WARNING

Dry cleaning solvent (Fed Spec P-D-680) used to clean parts is potentially dangerous to personnel and property. Do not use near open flame or excessive heat. Flash point of solvent is 100°F to 138°F (38°C to 59°C).

Wipe the fan blades with a clean cloth dampened slightly with dry cleaning solvent (Fed Spec P-D-680) and dry thoroughly.

Inspection. Check the fan for breaks, cracks, dents, loose rivets and bent or otherwise deformed blades. Replace the condenser fan if it is defective.

Installation.

-) Slip the fan onto the motor shaft with hub facing the motor and approximately 1/2 inch (1.27 cm) shaft extending through the hub. Align the setscrews with the flat surfaces on the motor shaft.
-) Tighten the setscrew(s).
-) Carefully position the fan and motor assembly in the unit.
-) Install the four screws and check fan for clearance by spinning the fan by hand. Clearance between the blade tips and fan shroud should be even. If necessary, loosen the screws and adjust clearance.
-) Install the rear panel.
-) Connect power to the unit.

CONDENSER FAN MOTOR

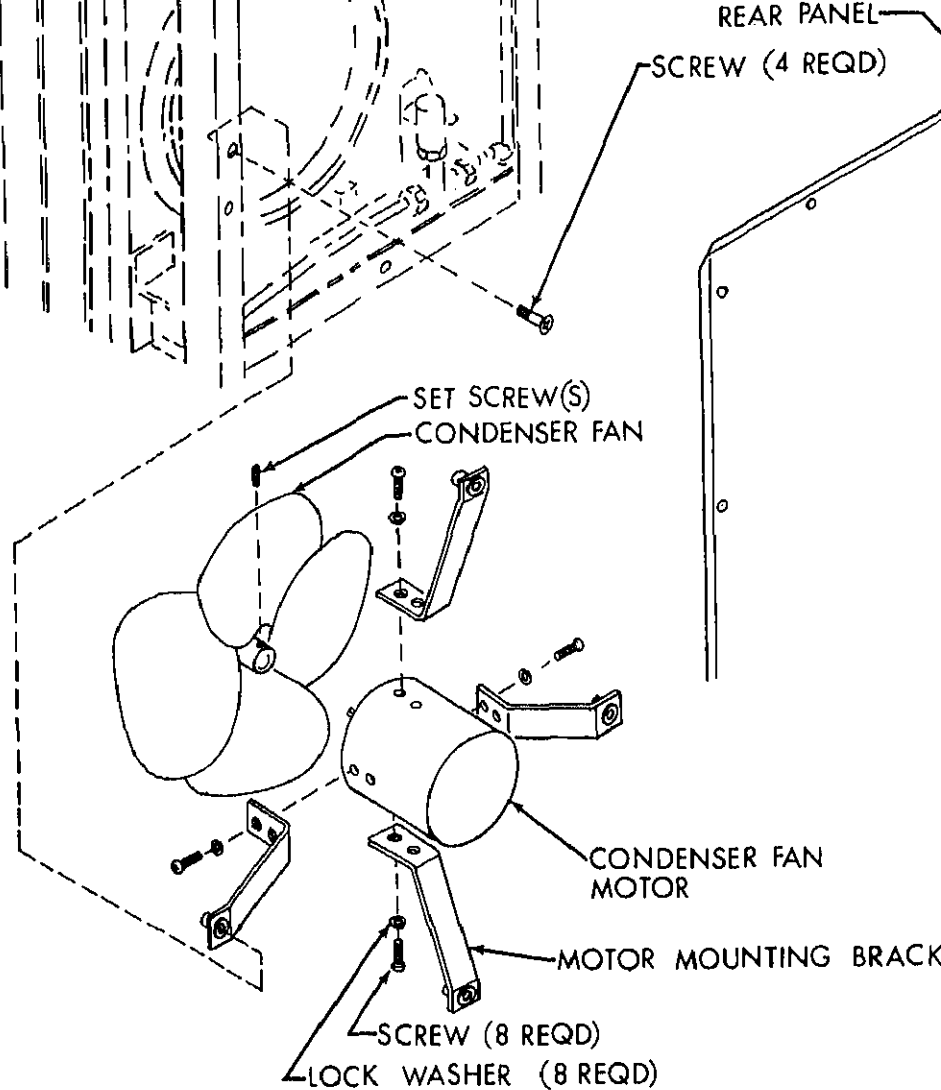
(figure 4-13).

Removal.

WARNING

Disconnect power from the air conditioner before performing maintenance on electrical components. The voltage used can be lethal.

-) Disconnect power.
-) Remove the rear panel.
-) Tag and disconnect the motor leads from the terminal board and the capacitor.
-) Remove the four screws that attach the motor mounting brackets to the frame.
-) Carefully remove the motor and fan assembly from the unit.



TS 4120

Figure 4-13. Condenser Fan Motor.

WARNING

Dry cleaning solvent (Fed Spec P-D-680) used to clean parts is potentially dangerous to personnel and property. Do not use near open flame or excessive heat. Flash point of solvent is 100°F to 138°F (38°C to 59°C).

Cleaning. Wipe the motor and the other disassembled parts with a clean cloth dampened slightly with cleaning solvent (Fed Spec P-D-680) and dry thoroughly.

Inspection.

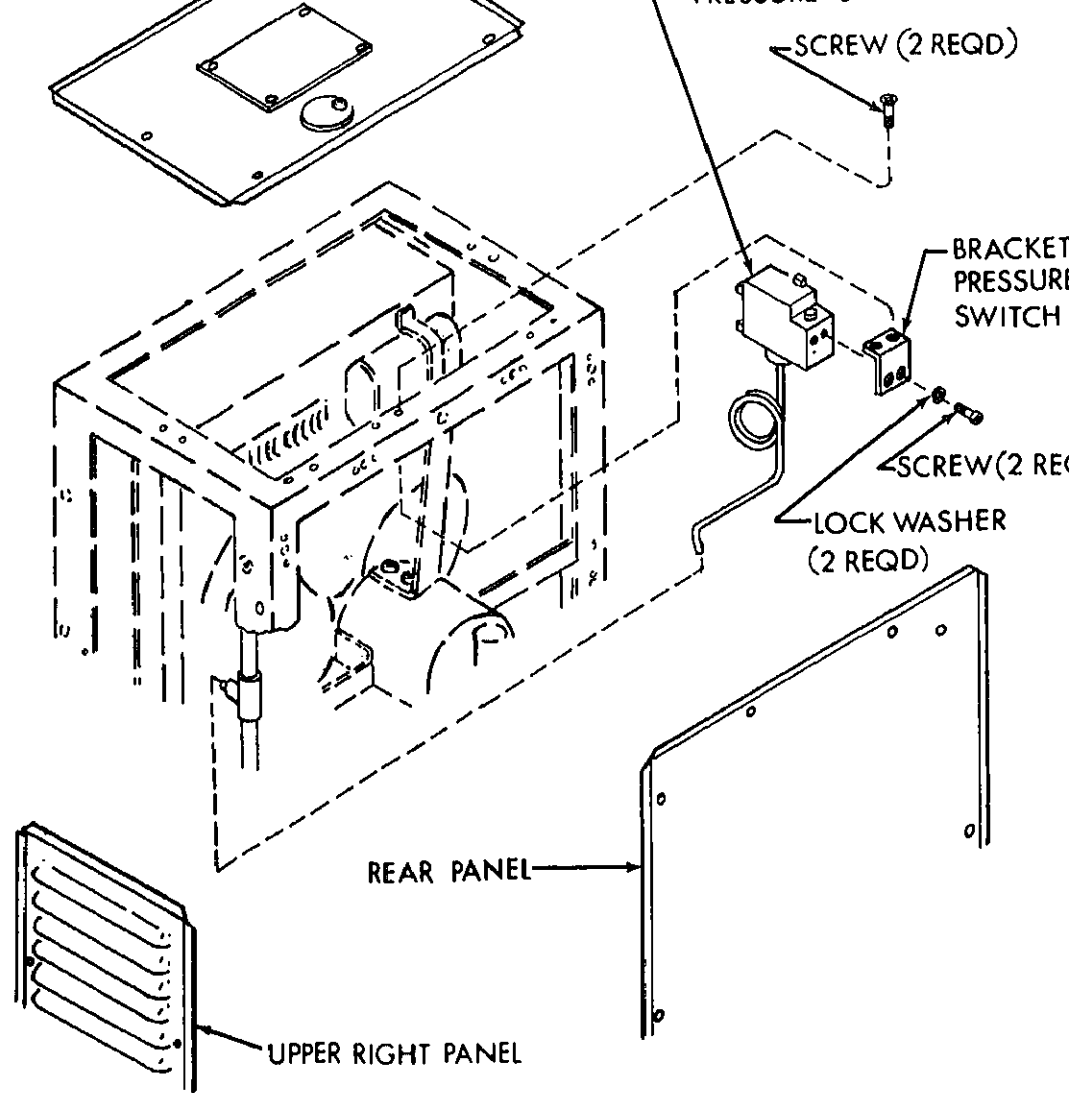
- 1) Check the motor for dents, cracks, condition of threads in mounting holes, loose or damaged lead wires and free rotation of motor shaft. If a defect is found that could cause the unit to malfunction, replace the motor.
- 2) Check the fan for breaks, cracks, dents, loose rivets and bent or otherwise deformed fan blades. Replace the fan if it is defective.
- 3) Check the mounting brackets for breaks, cracks, dents and condition of threads in blind nuts. Repair minor damage using conventional sheet metal repair methods. Replace damaged blind nuts or mounting bracket if damage indicates replacement.

Testing.

- 1) Using a continuity tester, check for continuity between motor leads. If a lack of continuity is shown, an open winding is indicated. Replace the motor.
- 2) Check for continuity between the red lead and the motor frame. If there is continuity, one of the windings is shorted to ground. Replace the motor.

Installation.

- 1) Attach the motor mounting brackets to the motor with eight screws and lock washers. Take care to strip the threads in the aluminum motor housing. The two identical brackets go to the sides, longest bracket to the top and the shorter bracket to the bottom.
- 2) Slip the fan onto the motor shaft with the hub facing the motor and approximately 1/2 inch (1.27 cm) of shaft extending through the hub. Align the setscrew(s) with the flat surfaces on the motor shaft and tighten the setscrew(s).
- 3) Carefully position the fan and motor assembly in the unit.
- 4) Install the four screws and check fan for clearance by spinning the fan by hand. Clearance between the blade tips and the fan shroud should be even. If necessary, loosen the mounting bracket screws and adjust the clearance.
- 5) Connect the motor leads to the terminal board and capacitor. See tags on removed motor and wiring diagram, figure 4-7.
- 6) Install the rear panel.
- 7) Connect power to the unit.



TS 4120-362-13

Figure 4-14. Pressure Switch

WARNING

Disconnect power from the air conditioner before performing maintenance on electrical components. The voltage used can be lethal.

5. Inspection of installed items.

(1) Disconnect power.

(2) Check for loose terminals, missing mounting hardware, cracks, breaks or other defects. Replace defective parts.

6. Replacement. When it is necessary to replace the pressure switch, report condition to district maintenance (paragraph 5-4).

7. Cleaning. Wipe the pressure switch with a clean, dry, lint free cloth.

If operational check and inspection indicated that parts were acceptable, replace the top, upper rear panels and connect power.

18. RECTIFIER (CONDENSER SECTION)

(figure 4-15).

Rectifier CR1 is required to transform alternating current into direct current for the control circuit. It is located in the fuse bracket in the condenser section.

1. Access. Remove the upper right panel and the rear panel.

WARNING

The following test must be conducted with the power on. Exercise extreme caution.

2. Operational check.

(1) Place power switch SW2 in ON position.

(2) With a voltmeter, check for input voltage of 115 volts ac. With the proper input voltage, the output of 103 volts dc. Refer to figure 4-7, wiring diagram. Replace the rectifier if it is defective.

3. Removal.

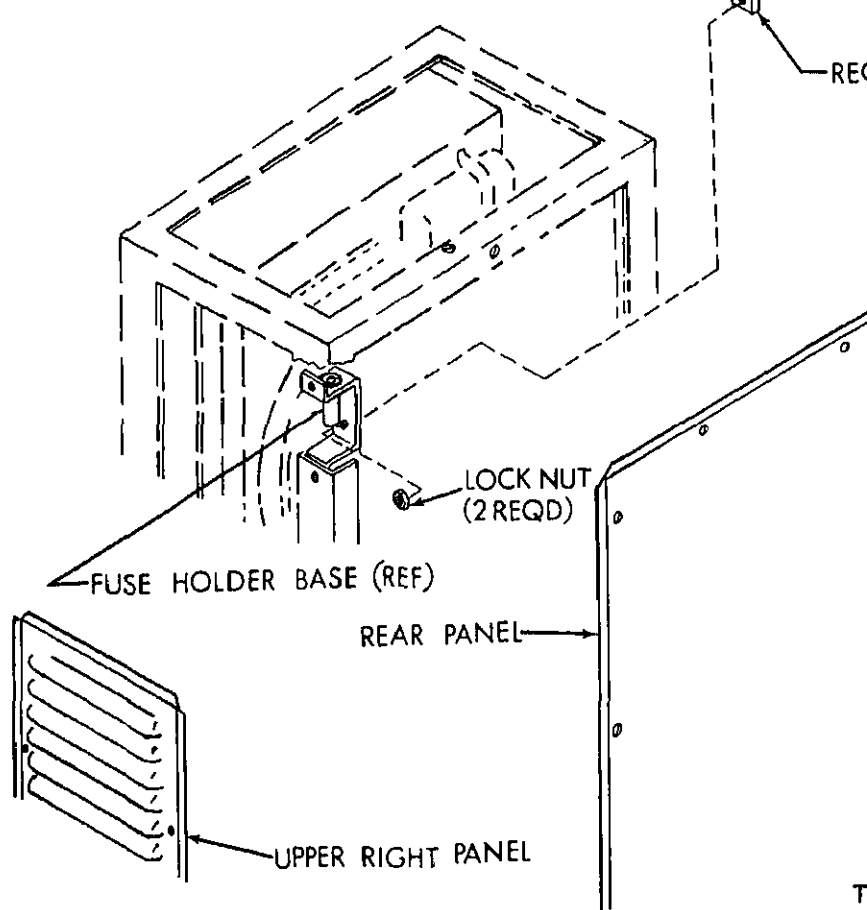


Figure 4-15. Rectifier

WARNING

Disconnect power from the air conditioner before performing maintenance components. The voltage used can be lethal.

- (1) Disconnect power.
 - (2) Tag and unsolder wire leads.
 - (3) Remove the two screws and nuts.
 - (4) Remove the rectifier.
- d. Installation.
- (1) Install the rectifier using two screws and nuts.

REFRIGERANT PIPING. (CONDENSER SECTION)

(figure 4-16).

Access. Remove the top, upper right and rear panels and the hood.

Inspection of installed items. Inspect tubing and fittings visually for nicks, cuts, cracks, dents and kinks. If damage appears minor, test for leaks. If no leaks are detected and dents and kinks are not severe enough to restrict refrigerant flow, consider the tubing serviceable. If a leak or severe dent or kink is found, report to direct support maintenance for repair or replacement.

Testing. Test by one of the following methods.

CAUTION

The electronic leak detector is sensitive to the presence of refrigerant gas in the atmosphere. When refrigerant gas is present in the atmosphere of the work area, false indications can result. Use in a well ventilated but draft-free area.

-) Electronic Leak Detector. Turn the electronic unit on, and slowly pass the probe around all possible points of leakage in the refrigeration system where a leak could exist. Depending upon the type of detector used, a leak will be indicated by an audible signal, a light, or by meter deflections.
-) Soap Solution. Brush soap solution on all possible points of leakage, and watch for bubbles. Follow a definite sequence to avoid missing any points that should be tested. Wipe the solution from the joints, and mark any point at which a leak is found.

Replacement. If test results show any leaks, mark the location and report to direct support maintenance.

SERVICE VALVE. (CONDENSER SECTION)

The service and line shutoff valve can be used to check pressure or to add refrigerant to the system through the service line (figure 4-16).

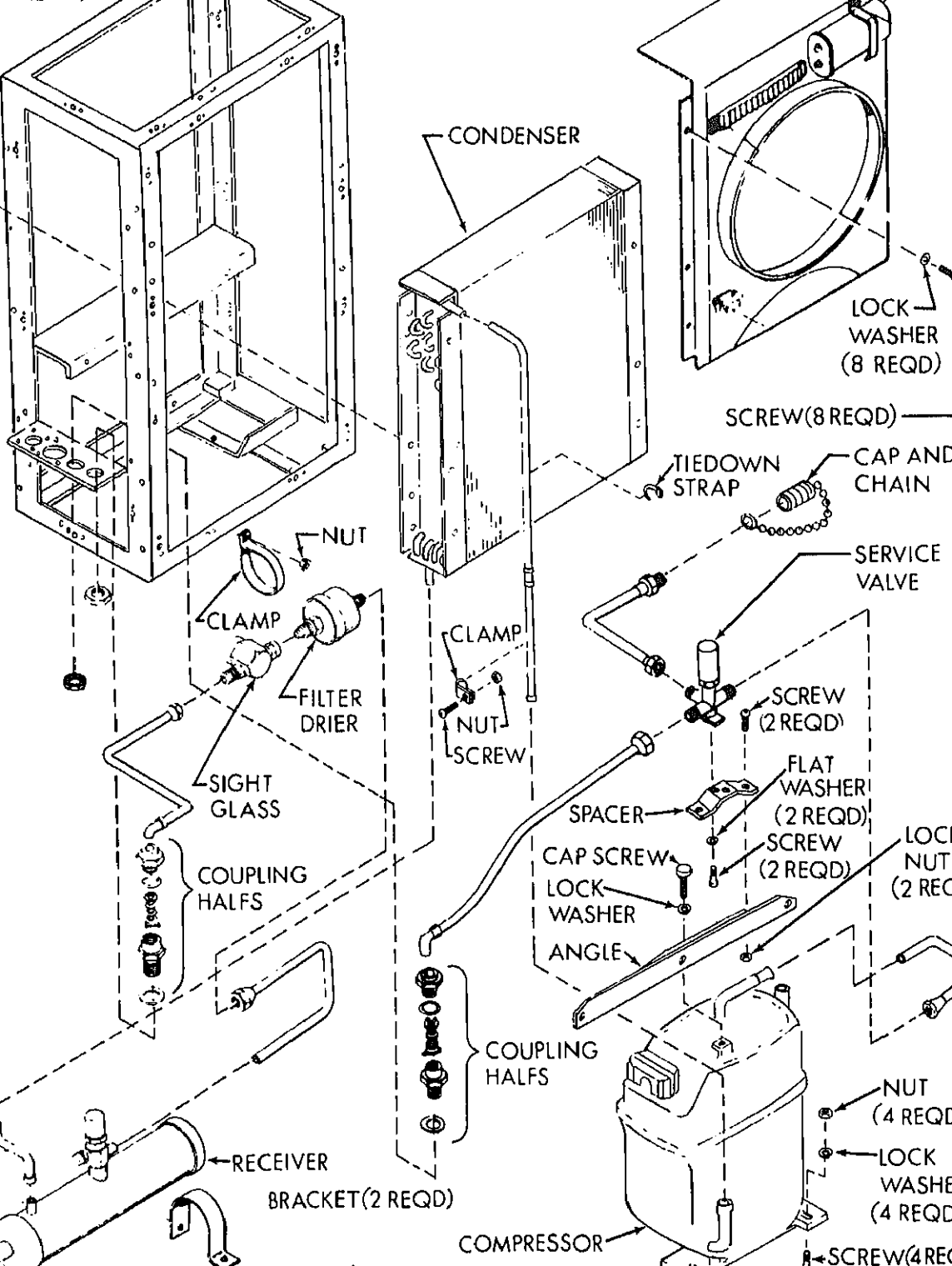
Access. Remove rear panel.

Inspection/Test of installed items.

-) Inspect to be sure the caps are in place on the valve stem and the charge connection port.
-) Test for leaks. See paragraph 4-19c.

Replacement. If test results show any leaks, mark location and report to direct support maintenance.

Install the rear panel.



Access. Remove hoods and upper panels above hoods from both sections.

Inspection of Installed Items. Check couplings for cracks, breaks, corrosion and loose connections.

Test for leaks. See paragraph 4-19c.

Replacement. If inspection or test results show any leaks or defects, mark location and report to direct support maintenance.

Install hoods and upper panels above the hoods.

2. COMPRESSOR. (CONDENSER SECTION)

Is the hermetically sealed type of compressor. It contains a compressor-motor assembly equipped with thermal-overload protection to prevent motor operation above its rated safe operating temperature. See figure 1-1.

WARNING

Disconnect power from the air conditioner before performing maintenance on electrical components. the voltage used can be lethal.

Access. Remove the intake air grille, the left side and the rear panels.

Inspection of Installed Items. Inspect for dents, corrosion, breaks, cracks and loose or missing mounting hardware.

Cleaning.

WARNING

Dry cleaning solvent (Fed Spec P-D-680) used to clean parts is potentially dangerous to personnel and property. Do not use near open flame or excessive heat. Flash point of solvent is 100°F to 138°F (38° to 59°C).

Wipe the exterior surface of the compressor with a clean cloth dampened slightly with dry cleaning solvent (Fed Spec P-D-680) and dry thoroughly.

Testing.

- (1) Check compressor overload protector for an open circuit between terminals 1 and 3 with a continuity tester.
- (2) Reset pressure switch by depressing reset button on top panel of condenser section as necessary.
- (3) Test terminals S, R and C for continuity with a continuity tester. The compressor must be replaced if there is an open circuit. Refer to direct support maintenance.

(5) If any damage is evident test for leaks using one of the methods listed in paragraph

e. Replacement. Refer to direct support maintenance.

f. Install the intake air grille, and the left side and rear panels.

4-23. COMPRESSOR START CAPACITOR. (CONDENSER SECTION)

(figure 4-17).

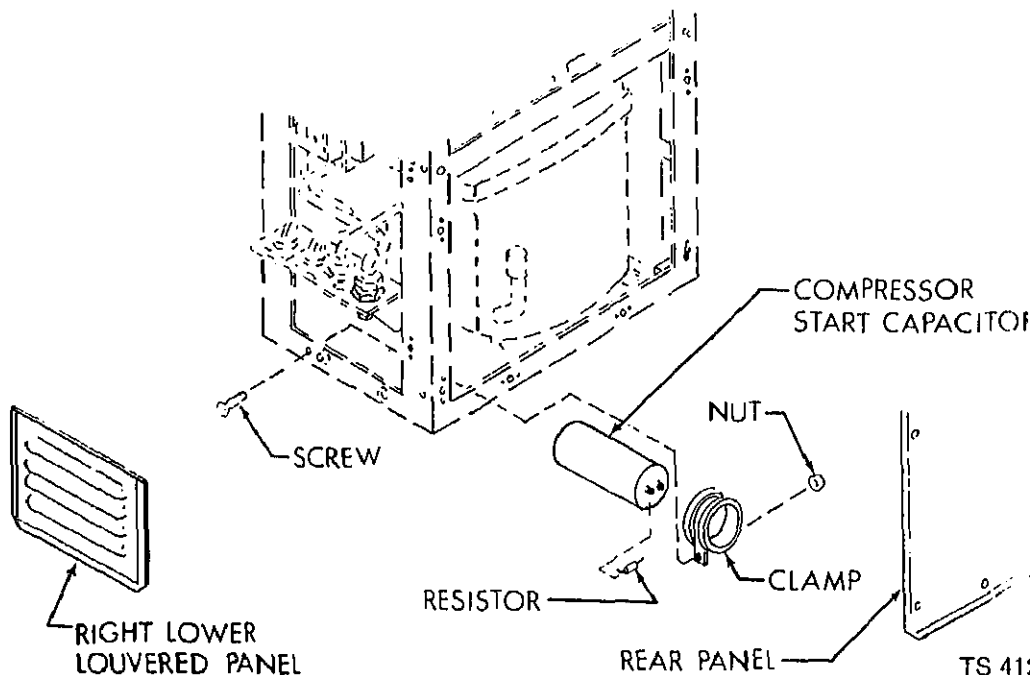


Figure 4-17. Compressor Start Capacitor.

WARNING

Disconnect power from the air conditioner before performing maintenance on components. The voltage used can be lethal.

a. Removal.

(1) Disconnect power.

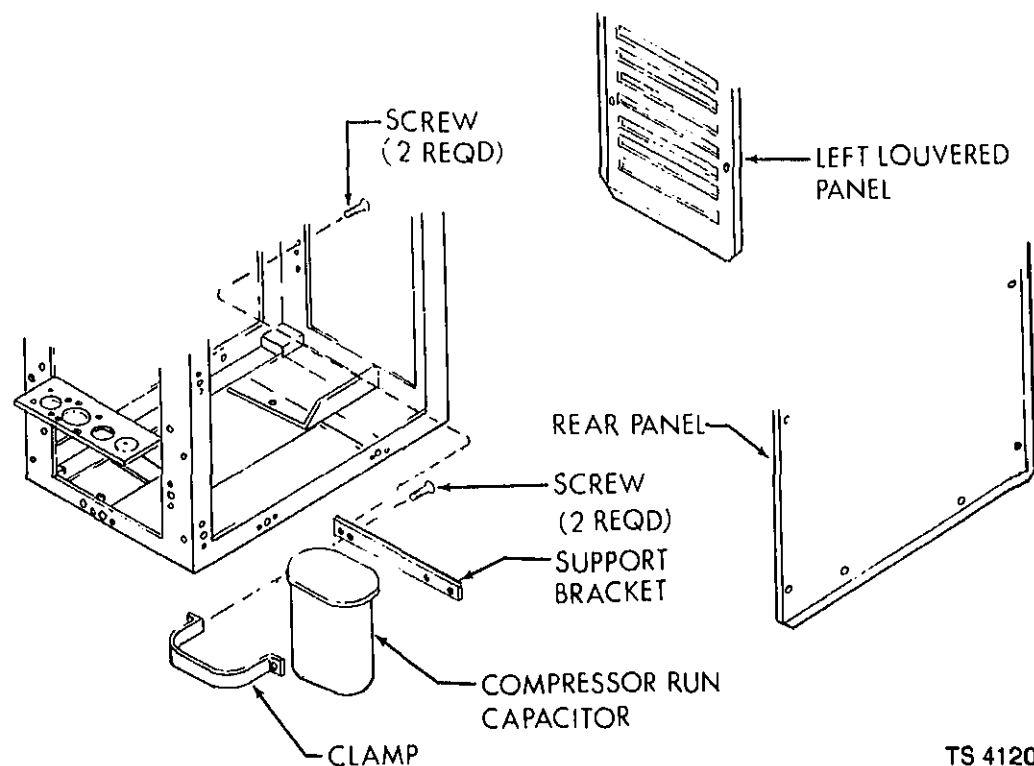
(2) Remove the right lower louvered panel and the rear panel.

WARNING

- (5) Remove the capacitor.
- b. Cleaning. Wipe capacitor with a clean dry cloth.
- c. Testing. Test a suspected defective capacitor with a capacitance tester. Replace if found bad. If a capacitance tester is not available, refer to direct support.
- d. Installation.
- (1) Install capacitor using clamp, screw and nut.
 - (2) Connect the leads. See figure 4-7, wiring diagram.
 - (3) Install the right lower louvered panel and rear panel.
 - (4) Connect power.

24. COMPRESSOR RUN CAPACITOR. (CONDENSER SECTION)

(figure 4-18).



WARNING

Disconnect power from the air conditioner before performing maintenance on electrical components. The voltage used can be lethal.

a. Removal.

- (1) Disconnect power.
- (2) Remove the left louvered panel and the rear panel.

WARNING

Discharge capacitor before touching the two terminals.

- (3) Tag and disconnect the leads.
 - (4) Disconnect the clamp holding the capacitor to the support bracket by removing two screws.
 - (5) Remove the capacitor.
- b. Cleaning. Wipe capacitor with a clean dry cloth.
- c. Testing. Test a suspected defective capacitor with a capacitance tester. Replace if found defective. If a capacitance tester is not available, refer to direct support.
- d. Installation.
- (1) Position the capacitor and clamp and attach with two screws.
 - (2) Connect the leads. See figure 4-7, wiring diagram.
 - (3) Install the left louvered panel and the rear panel.
 - (4) Connect power.

4-25. CONDENSER FAN MOTOR RUN CAPACITOR (CONDENSER SECTION)

(figure 4-7)

WARNING

Disconnect power from the air conditioner before performing maintenance on electrical components. The voltage used can be lethal.

a. Removal.

- (1) Disconnect power.

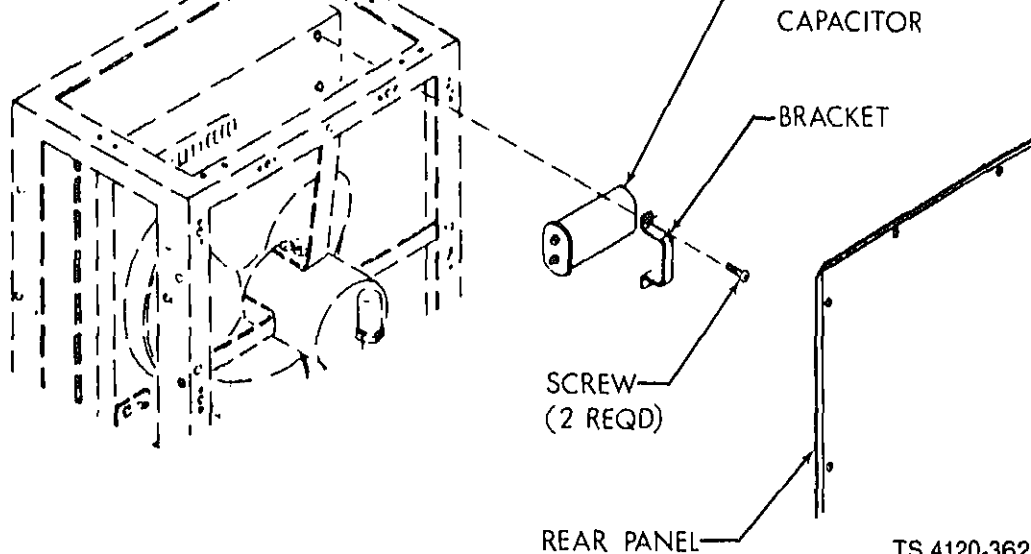
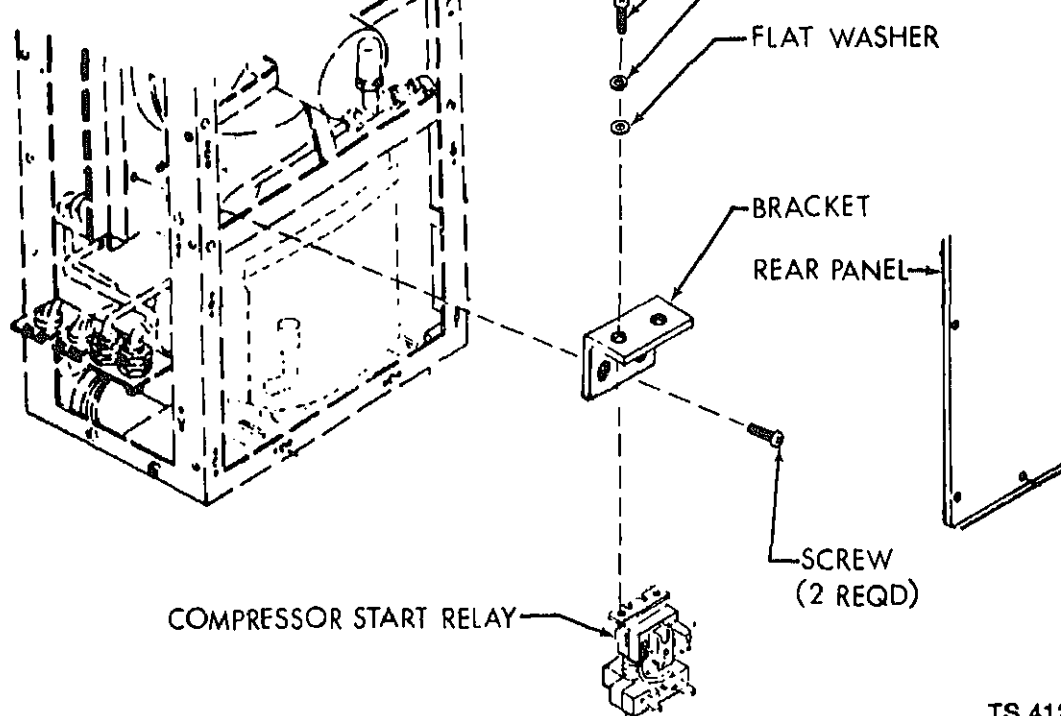


Figure 4-19. Condenser Fan Motor Run Capacitor

WARNING

Discharge capacitor before touching the two terminals.

- (3) Tag and disconnect the leads.
 - (4) Loosen or remove the two screws and the bracket.
 - (5) Remove the capacitor.
- b. Cleaning. Wipe capacitor with a clean dry cloth.
- c. Testing. Test a suspected defective capacitor with a capacitance tester. Replace if found bad. If a capacitance tester is not available, refer to direct support.
- d. Installation.
- (1) Clamp the capacitor in place using the two screws and the bracket.
 - (2) Connect the leads. See figure 4-7, wiring diagram.
 - (3) Install the rear panel.
 - (4) Connect power.



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Figure 4-20. Compressor Start Relay.

WARNING

Disconnect power from the air conditioner before performing maintenance on components. The voltage used can be lethal.

a. Access.

- (1) Disconnect power.
- (2) Remove the rear panel.

b. Inspection/Testing of Installed Items.

- (1) Inspect for breaks, cracks, corrosion, rust and loose connections.
- (2) Place the probes of a continuity checker on terminals 5 and 13 on the terminal block to check for continuity. For reference, see wiring diagram, figure 4-7.

WARNING

WARNING

Disconnect power from the air conditioner before performing maintenance on electrical components. The voltage used can be lethal.

- (1) Disconnect power.
- (2) Tag and disconnect the wire leads.
- (3) Remove two each of screws, lock washers and flat washers.
- (4) Remove the compressor start relay.

d. Installation.

- (1) Install the compressor start relay with two each of screws, lockwashers and flat washers.
- (2) Connect the wire leads. See figure 4-7, wiring diagram.
- (3) Install the rear panel.
- (4) Connect power.

4-27. SIGHT GLASS. (CONDENSER SECTION)

(figure 4-16).

The sight glass is located under the condenser just behind the condenser intake grille. The condenser liquid refrigerant is seen through this glass when the unit is in the cooling mode.

a. Access. Remove the intake air grille (figure 4-8).

b. Inspection/Test of Installed Items.

- (1) Inspect for cracked or broken glass, leaks and corrosion. If glass is cracked or broken, refer to direct support maintenance.
- (2) If a leak is indicated, test per paragraph 4-19c.

c. Replacement. If inspection/test results indicate replacement, refer to direct support maintenance (para 5-9).

d. Install the intake air grille.

4-28. RECEIVER. (CONDENSER SECTION)

(figure 4-16).

The receiver consists of a steel container for collecting the high pressure liquid refrigerant from the condenser. The valve on top of the receiver can be used for releasing the refrigerant charge. The valve must be closed before operating the unit.

a. Access. Remove the intake air grille. See figure 4-8.

(3) Make sure valve stem cap is ON.

(4) If a leak is indicated, test per paragraph 4-19c.

Replacement. If inspection/test results indicate replacement, refer to direct support maintenance (para 5-11).

Install the intake air grille.

9. CONDENSER COIL. (CONDENSER SECTION)

(figure 4-16).

coil consists of copper tubing and has aluminum fins which transfer heat from the refrigerant to the air.

Access (figures 4-8 and 4-9). Remove the following grilles and panels, discharge air grille, right upper louvered panel, left louvered panel and the rear panel.

Inspection/Test of installed items.

- (1) Check for accumulated dirt. Clean if an accumulation of dirt is evident.
- (2) Check fins for dents, bent edges or any condition that would block or distort air flow. Straighten damaged fins with a plastic fin comb.
- (3) If a leak is indicated, test per paragraph 4-19c.

WARNING

Compressed air used for cleaning purposes will not exceed 30 PSI.

Cleaning. Clean coil with a soft bristled brush, or use compressed air at 30 psi or less from the inside of the coil to blow the dirt out. Take care to avoid fin damage.

Repair/Replacement. If inspection/test results indicate repairs or replacement, refer to direct support maintenance (para 5-12).

Install the following grilles and panels, discharge air grille, right upper louvered panel, left louvered panel and the rear panel.

10. FRAME. (CONDENSER SECTION)

Access. Remove all panels, grilles and the hood. See figures 4-8 and 4-9.

Inspection/Test of installed item.

- (1) Check for missing, loose or damaged hardware. Replace all hardware found missing or defective.
- (2) Inspect for dents, bends and cracked or broken welds. Refer defective condition to direct support maintenance.

operator section is housed within metal panels and adjustable grilles or louvers. Quick release 1/4 turn stud fasteners permits easy removal of panels. The hood is retained by standard machine screws.

Removal. Remove the panels that have quick release 1/4 turn stud fasteners by turning the fasteners in counterclockwise and pulling the panel outward.

WARNING

Dry cleaning solvent (Fed Spec P-D-680) used to clean parts is potentially dangerous to personnel and property. Do not use near open flame or excessive heat. Flash point of solvent is 100°F (38°C to 59°C).

Cleaning. Clean the panels with a cloth dampened with a detergent solution or dry cleaning solvent (Fed Spec P-D-680). Use a soft brush if necessary to dislodge caked on dirt. Dry the items thoroughly.

Inspection/Repair. Inspect panels for breaks, cracks, dents, loose or missing mounting hardware or objects. Repair breaks, cracks and dents using conventional steel metal repair methods. Replace missing mounting hardware and panels damaged beyond repair. Inspect the Identification plate rivets to the inside of the upper left panel for legibility and obvious damage. Replace it if you cannot read all of the information shown on the plate. Inspect gasket material, using the following procedure:

Remove as much old gasket material as possible by pulling or scraping it away from the mating surface.

WARNING

Acetone and methyl-ethyl ketone (MEK) are flammable and their vapors can be explosive. Repeated or prolonged skin contact or inhalation of vapors can be toxic. Use a well ventilated area, wear gloves, and keep away from sparks or flame.

Soften and remove old adhesive and gasket residue, using acetone or methyl-ethyl ketone (MEK) and a stiff brush.

Coat the mating surfaces of the metal and the gasket with adhesive. Let both surfaces air dry until the adhesive is tacky but will not stick to the fingers.

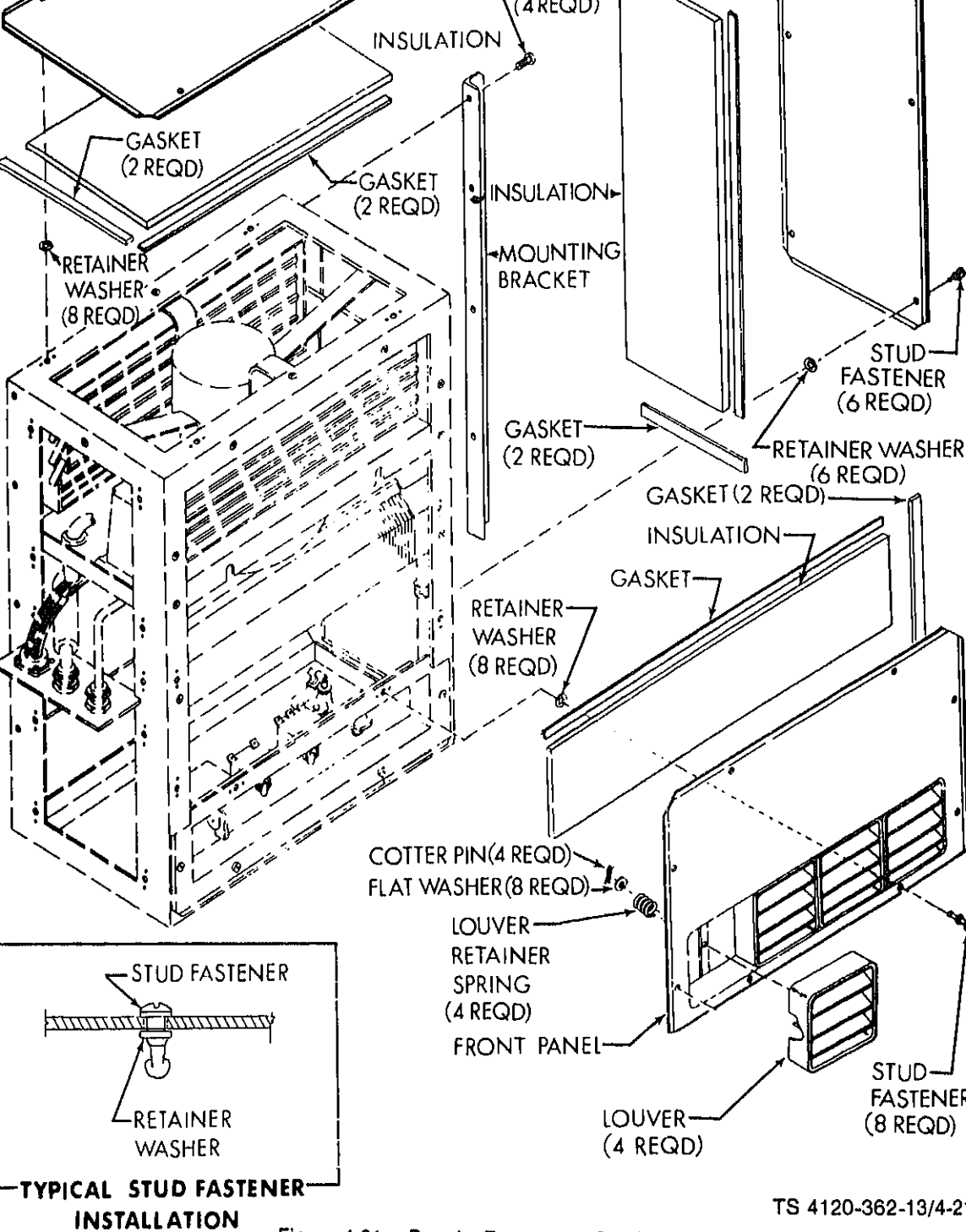
Starting with an end, carefully attach the gasket to the metal. Press into firm contact all over the mating surface.

Finishing. If either touch up or refinishing is necessary, see TM43-0139.

Installation.

If the Identification plate was removed, reinstall with rivets.

If the electrical connector covers were removed, reinstall with rivets.



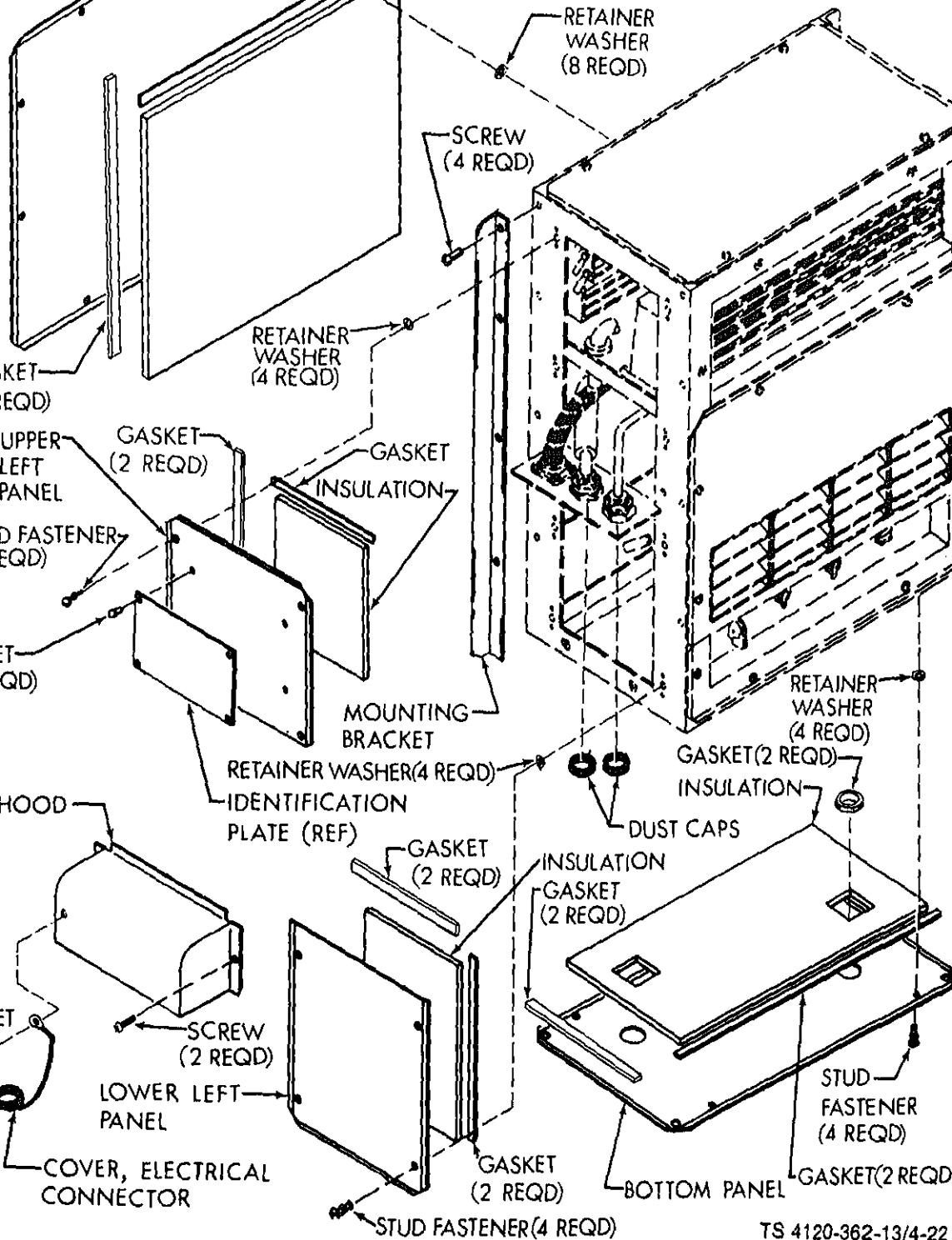


Figure 4-22. Panels and Hood, Evaporator Section

WARNING

Disconnect power from the air conditioner before performing maintenance on electrical components. The voltage used can be lethal.

a. Access. See figures 4-21 and 4-22.

- (1) Disconnect power.
- (2) Remove the following outside panels: top panel, right side panel, front panel, upper left panel, and the back panel.
- (3) Remove the hood by unscrewing two machine screws.
- (4) Release the 1/4 turn studs on the control panel and carefully pull the control panel out to gain access to the wire connections on the back side of the panel.

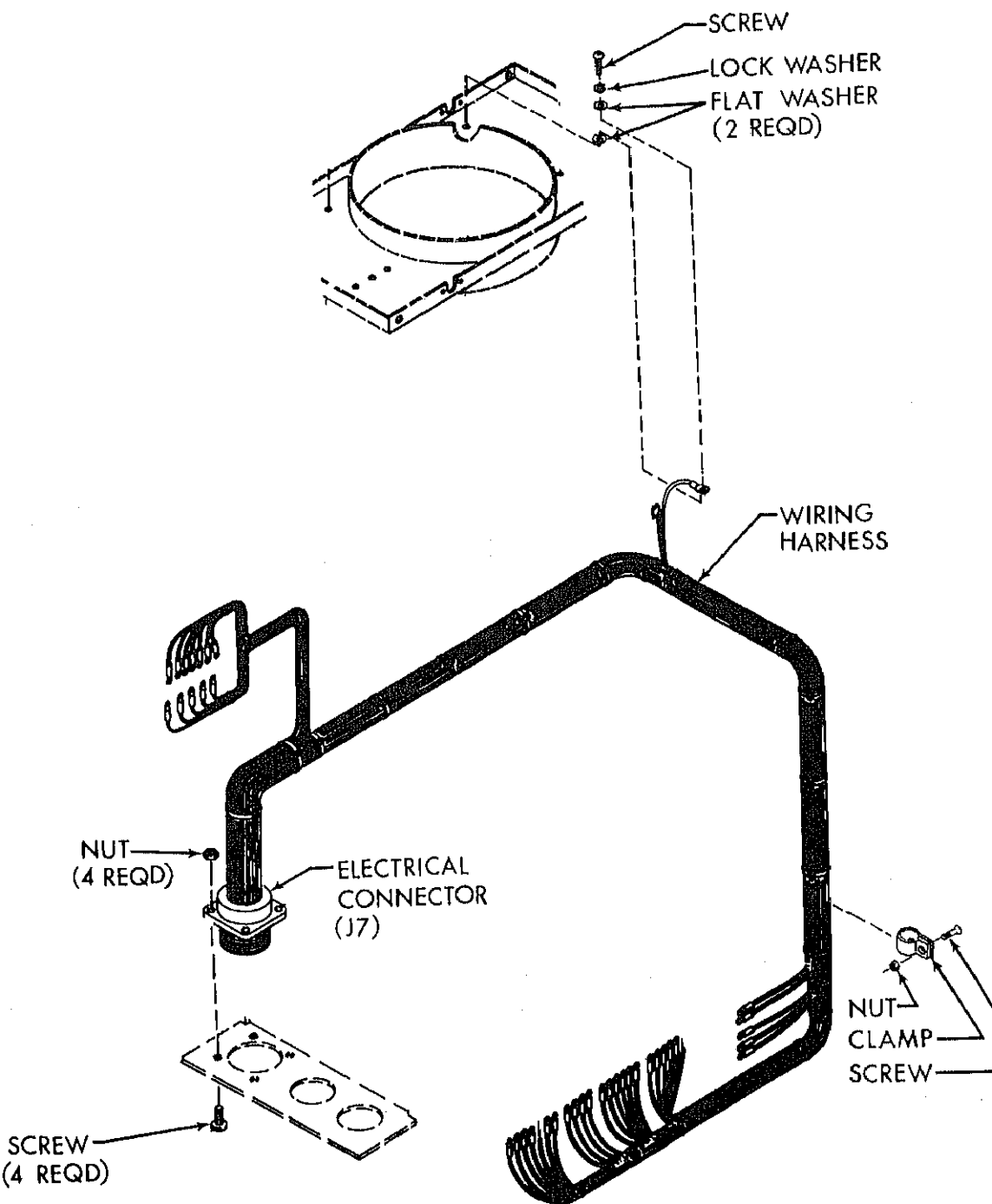
b. Inspection.

- (1) Inspect connector for damage and loose or broken pins. Replace if defective.

c. Testing. Using wiring diagram in figure 4-5, check individual wires for continuity. If continuity is indicated, check solder and terminal lug connections and condition of wire. Repair all defective connections and replace all damaged wires.

d. Repair or Replace. Preferred repair methods consist of replacing wires, terminals, connectors, and components rather than splicing wires, bending ends to form terminals, and other make shift procedures, although these may be appropriate for emergency field repairs. Determine the proper size and length of wire and connector to be used for replacement by referring to Table 4-5, Wire List, and to the wiring diagram (figure 4-7).

- (1) Soldering Connections. Wire connections must be made mechanically sound before soldering; solder alone does not provide sufficient strength to prevent breakage. Joint surfaces to be soldered must be clean and bright. If a separate flux is used, it should be Specification MIL-F-4995, Type I, resin-alcohol flux, and should be brushed onto the surfaces before soldering. If a flux-core solder is used, it should always be resin-core electrical solder. If lead-tin solder is used, it should be a lead-tin solder conforming to Specification QQ-S-571. Wires should be heated to the point at which the solder will melt completely and flow into a joint. Excessive buildup of solder globs on the joint should be avoided or removed.
- (2) Insulating Joints. The preferred method of insulating electrical joints is by the use of heat-shrink tubing. To apply, cut a piece of heat-shrink tubing of suitable diameter to a one-inch (2.54 cm) length covering joints at terminals or connectors, or to a length about 1/2-inch (1.27 cm) longer than the joint to be insulated, and slide the tubing over the wire before making the joint. After the joint is made, slide the tubing over the joint, and shrink in place with moderate heat.



WIRING HARNESS EVAPOR

65	J7-A	MS3102R22-19P	S3-9
66	J7-B	MS3102R22-19P	S3-6
67	J7-C	MS3102R22-19P	S3-3
68	J7-D	MS3102R22-19P	GRD
69	J7-G	MS3102R22-19P	K4-11
70	J7-H	MS3102R22-19P	S2-3
71	J7-J	MS3102R22-19P	K4-10
72	J7-K	MS3102R22-19P	S2-12
73	J7-M	MS3102R22-19P	S2-9
74	J7-P	MS3102R22-19P	S2-6
75	S2-11	MS25036-106	K4-2
76	S2-8	MS25036-106	K4-5
77	S2-5	MS25036-106	K4-8
78	S2-2	MS25036-153	S4-2
79	S4-1	MS25036-153	S3-12
80	S4-3	MS25036-153	S5-1
81	S5-2	MS25036-106	S3-10
82	S3-7	MS25036-106	HR1-6
83	S3-4	MS25036-106	HR1-2
84	S3-1	MS25036-106	HR1-1
85	S3-11	MS25036-106	K4-7
86	S3-8	MS25036-106	K4-3
87	S3-5	MS25036-106	K4-4
88	S3-2	MS25036-106	K4-9
89	K4-8	MS25036-106	C1
94	K4-11	MS25036-106	K4-6
95	HR1-1	MS25036-153	HR1-3
96	HR1-3	MS25036-153	HR1-5
97	HR1-2	MS25036-153	HR1-4

the wire ends, holding the ends parallel and facing opposite directions, then twisting each end around the other wire at least three turns. Solder and apply insulation as described above.

- 4) **Crimping Terminals.** To install a terminal on the end of a wire, strip 1/4 to 1/2 inch (0.66 to 1.27 cm) insulation from the end of the wire, apply a one-inch (2.54 cm) piece of heat-shrink tubing (if the terminal is of the uninsulated type), and insert wire-end into the shank of the terminal. Crimp the shank and install heat-shrink tubing if necessary.

Reassembly.

- 1) Carefully position the control panel in place and engage the 1/4 turn stud fasteners.
- 2) Attach the hood with two machine screws.
- 3) Reinstall the following outside panels: two panel, right side panel, front panel, upper left panel and the back panel.
- 4) Connect power.

CONTROL PANEL. (EVAPORATOR SECTION)

(figure 4-24).

Control panel is located toward the bottom of the front of the evaporator section. It contains one mechanical switch and three electrical switches.

Inspection/Test of Installed Items. Inspect for dents, damaged or missing parts on hardware and proper operation of fresh and return air louver switch. Make repairs and replace missing parts.

WARNING

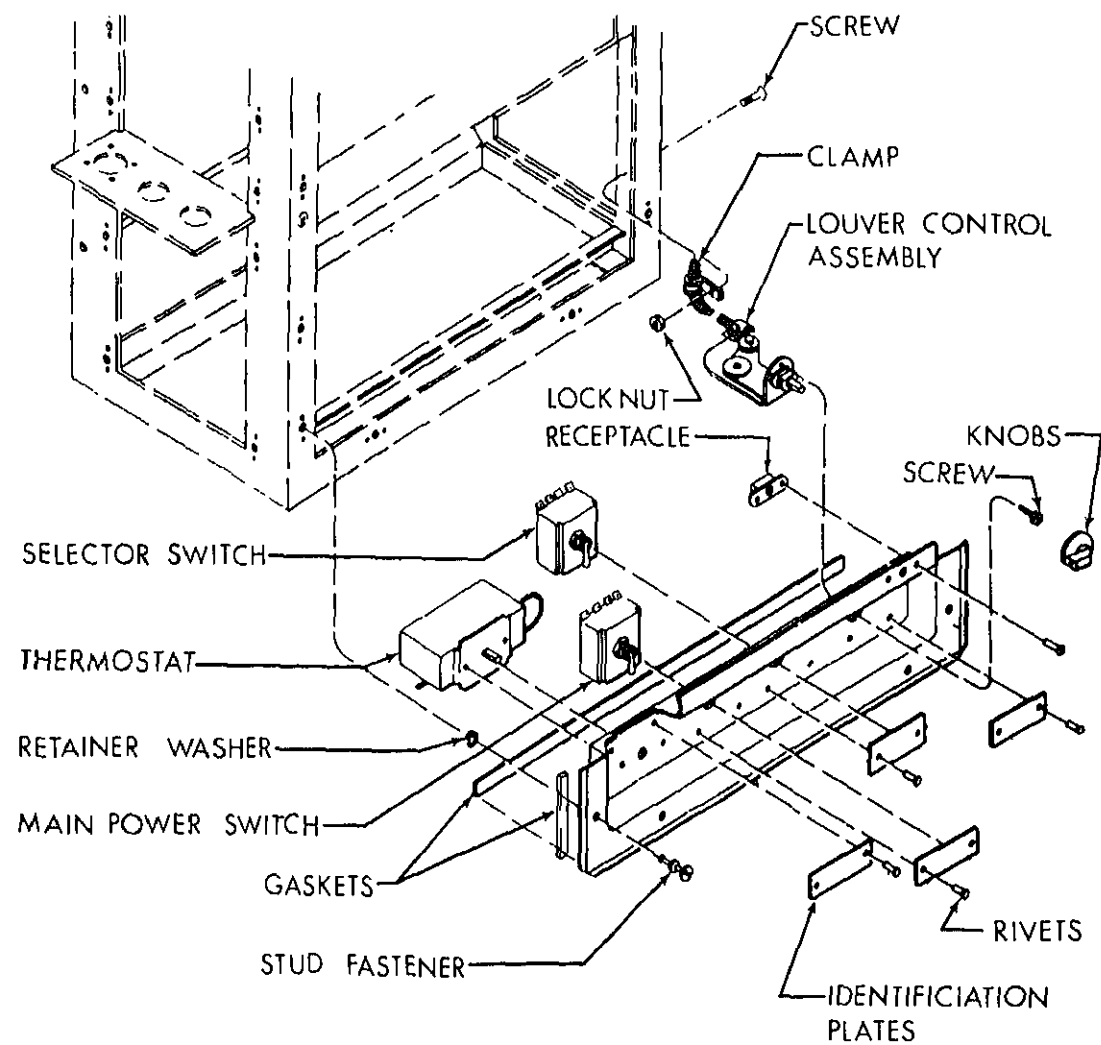
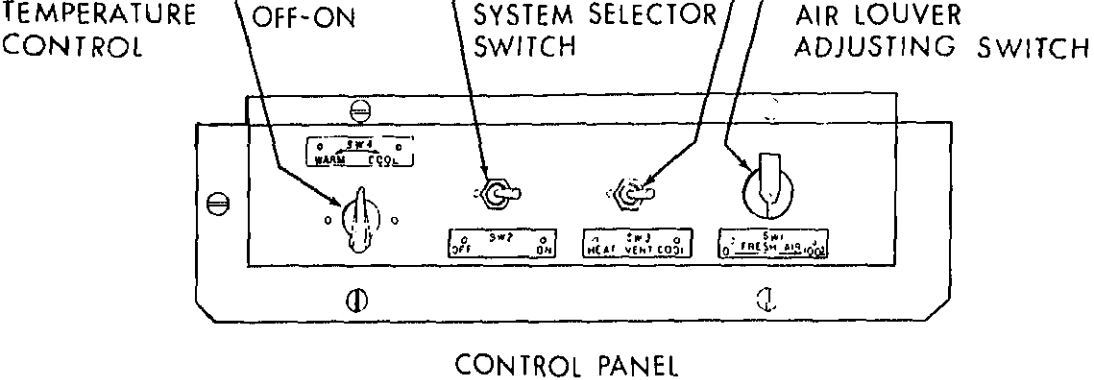
Disconnect power from the air conditioner before performing maintenance on electrical components. The voltage used can be lethal.

Removal.

- 1) Disconnect power.
- 2) Remove the front panel. See figure 4-21.
- 3) Release the 1/4 turn stud fasteners and carefully pull the control panel out far enough to gain access to the parts on the back of the panel.
- 4) Remove/loosen setscrews on knobs and pull knobs off.
- 5) Remove screws from switches 1 and 4 and nuts and washers from switches 2 and 3. Carefully remove the control panel from the switches.

WARNING

WARNING



Replace missing mounting hardware and panel if damaged beyond repair. Inspect the identification plates riveted to the outside of the panel for legibility and obvious damage. Replace them if you can read all of the information shown on the plates. Inspect gasket material for hardening, permanent cuts, tears or missing pieces. If necessary to replace gasket material, use the following procedures:

- 1) Remove as much old gasket material as possible by pulling or scraping it away from the metal surface.

WARNING

Acetone and methyl-ethyl ketone (MEK) are flammable, and their vapors can be explosive. Repeated or prolonged skin contact or inhalation of vapors can be toxic. Use a well ventilated area, wear gloves, and keep away from sparks or flame.

- 2) Soften and remove old adhesive and gasket residue, using acetone or methyl-ethyl ketone (MEK) and a stiff brush.
 - 3) Coat the mating surfaces of the metal and the gasket with adhesive. Let both surfaces air dry until the adhesive is tacky but will not stick to the fingers.
 - 4) Starting with an end, carefully attach the gasket to the metal. Press into firm contact all over.
- Painting. Should touch up or refinishing be necessary, see TM43-0139.

Reassembly/Installation.

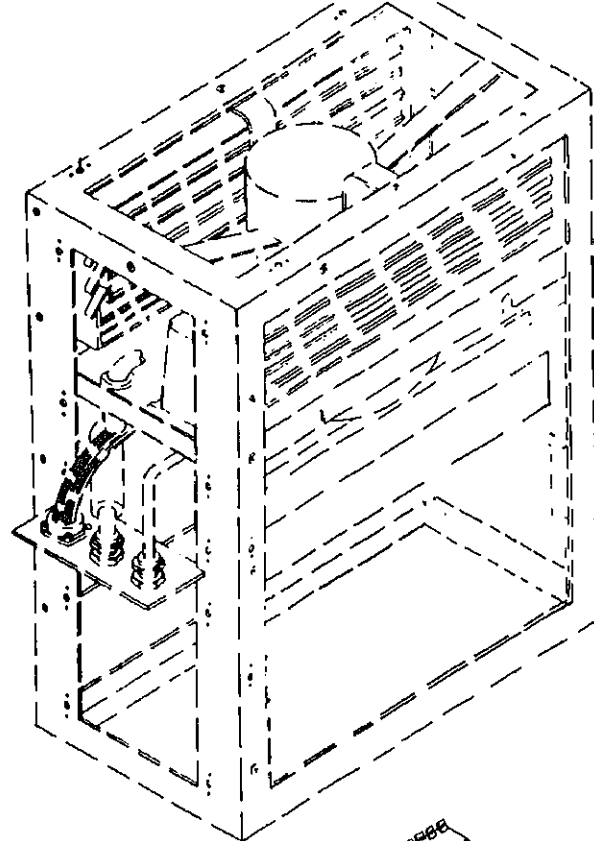
- 1) If identification plates were removed, install new plates with rivets.
- 2) Position switches in proper holes and attach switches 1 and 4 with screws and switches 2 and 3 with nuts and washers. Tab and key type washers must be aligned with switch shaft and holes in control panel.
- 3) Place knobs on shafts of switches 1 and 4 and tighten set screws. Take care to match knob position with information shown on identification plates.
- 4) Carefully position the control panel in place and engage the 1/4 turn stud fasteners.
- 5) Reinstall the front panel.
- 6) Connect power.

MAIN POWER OFF-ON SWITCH 2

(figure 4-25).

WARNING

Disconnect power from the air conditioner before performing maintenance on electrical components. The voltage used can be lethal.



FRONT PANEL

CONTROL
PANEL

SWITCH 2
MAIN POWER
OFF-ON

NUT

LOCK WASHER

LOCKING RING

TS 4120-362-13/4-

- (c) Release the 1/4 turn stud fasteners and carefully pull the control panel out far enough to gain access to the parts on the back of the panel.
- b. Testing.
- (1) Place switch in the ON position.
 - (2) Touch the probes of a continuity tester to terminals 2 and 3, 5 and 6, 8 and 9 and 11 and 12. *of terminals should indicate continuity. If this test does not indicate continuity, the switch is bad and should be replaced.*
- c. Removal.
- (1) Tag and remove wire leads.
 - (2) Remove nut, lock washer and locking ring.
 - (3) Remove switch.
- d. Installation.
- (1) Assemble switch to control panel using nut, lock washer and locking ring supplied with switch. Key type washers must be aligned with switch shaft and holder in control panel.
 - (2) Connect wire leads. See figure 4-7, wiring diagram.
 - (3) Carefully position the control panel in place and engage the 1/4 turn stud fasteners.
 - (4) Reinstall the front panel.
 - (5) Connect power.

4-35. HEAT, VENT, COOL SYSTEM SELECTOR SWITCH 3

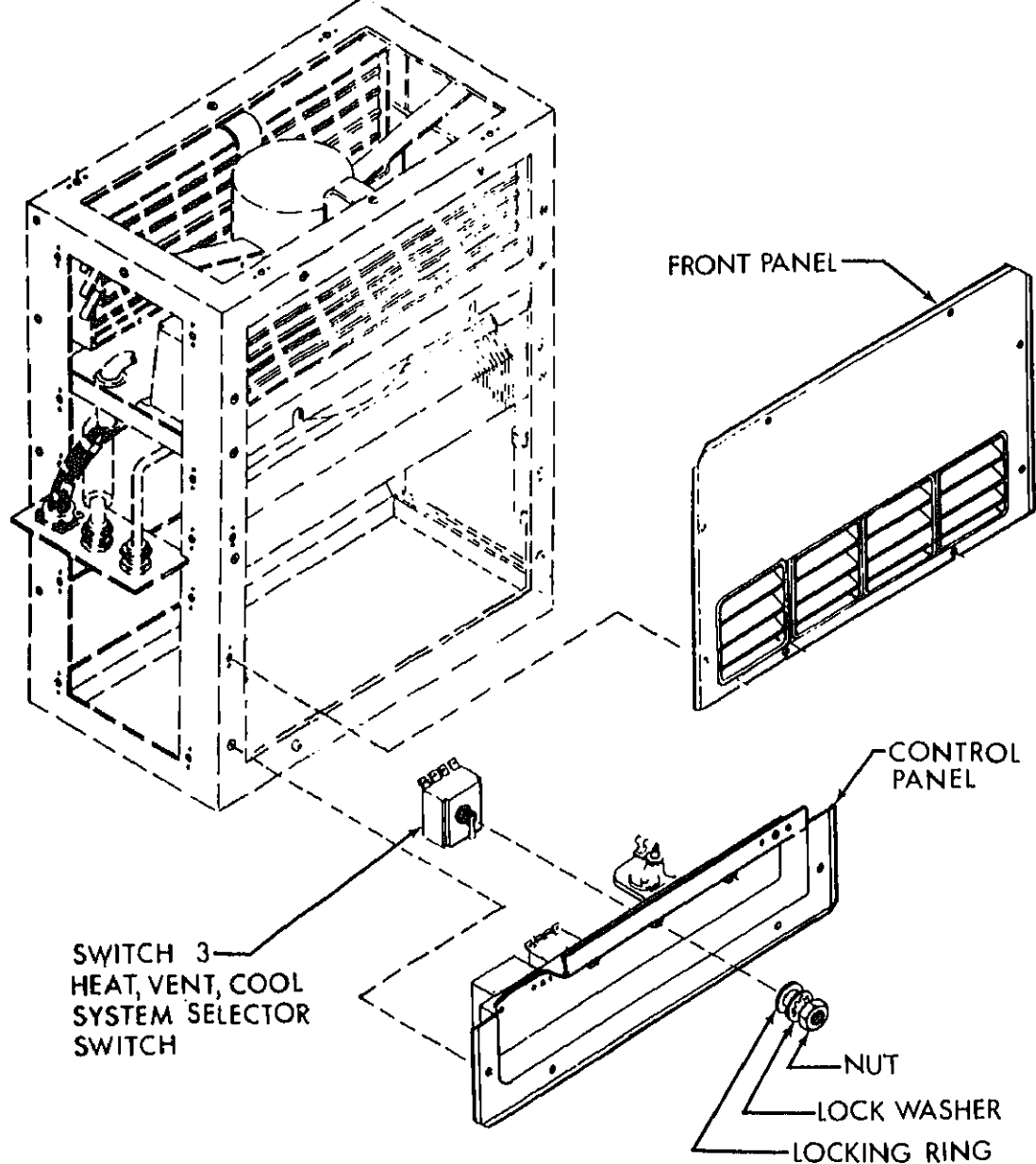
(figure 4-26).

WARNING

Disconnect power from the air conditioner before performing maintenance on electrical components. The voltage used can be lethal.

a. Access.

- (1) Disconnect power.
- (2) Remove the front panel.
- (3) Release the 1/4 turn stud fasteners and carefully pull the control panel out far enough to gain access to the parts on the back of the panel.



(3) Place switch in HEAT position.

(4) Touch the probes of a continuity tester to terminals 1 and 2, 4 and 5, 7 and 8 and 10 and 11. All of terminals should indicate continuity. If they do not, the switch is defective and should be replaced.

c. Removal.

(1) Tag and remove wire leads.

(2) Remove nut, lock washer and locking ring.

(3) Remove switch.

d. Installation.

(1) Assemble switch to control panel using nut, lock washer and locking ring supplied with switch. Key type washers must be aligned with shaft and holes in control panel.

(2) Connect wire leads. See figure 4-7, wiring diagram.

(3) Carefully position the control panel in place and engage the 1/4 turn stud fasteners.

(4) Reinstall the front panel.

(5) Connect power.

4-36. THERMOSTATIC TEMPERATURE CONTROL SWITCH 4

(figure 4-27).

WARNING

Disconnect power from the air conditioner before performing maintenance on electrical components. The voltage used can be lethal.

a. Access.

(1) Disconnect power.

(2) Remove the front panel.

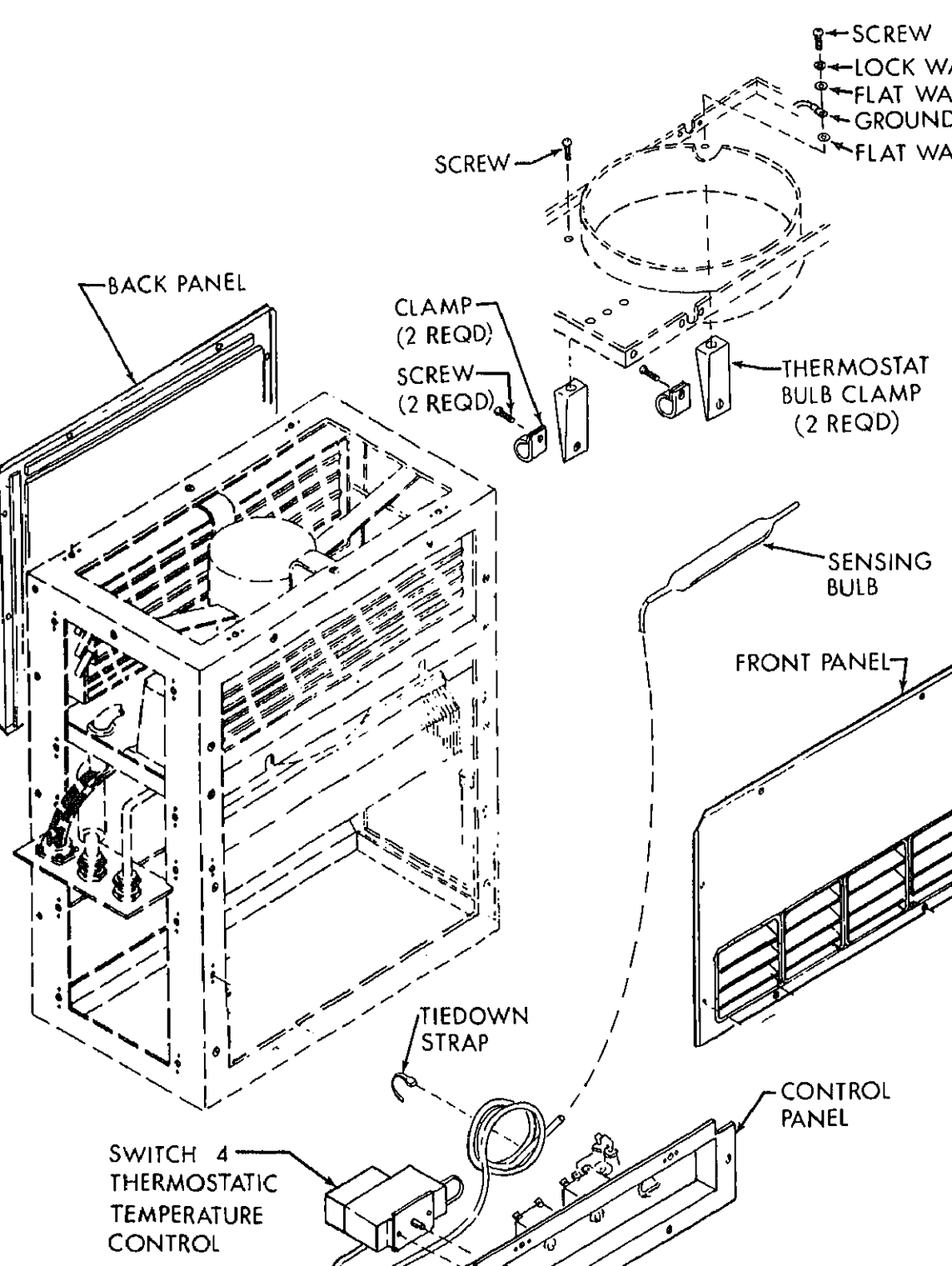
(3) Release the 1/4 turn stud fasteners and carefully pull the control panel out far enough to get to the parts on the back of the panel.

b. Testing.

(1) Place switch SW3 in COOL position.

(2) Touch probes of continuity tester to terminals 1 and 2 of thermostat which should indicate continuity.

(3) Rotate the thermostatic switch towards the warm position until a click is heard in the switch.



- (2) Loosen setscrews on knob and remove knob.
- (3) Remove screws and pull the switch from the control panel.
- (4) Remove the back panel.
- (5) Loosen the screws holding the sensing bulb clamps and carefully remove the sensing bulb and clamps.
- (6) Remove the tie down strap from the capillary line.
- (7) Remove the thermostatic temperature control switch from the unit.

d. Installation.

- (1) Carefully position the thermostatic switch in the unit.
- (2) Slip the sensing bulb in the clamps and tighten the clamp screws.
- (3) Carefully coil the capillary line and secure to the tubing close to the end of the sensing bulb with a new tie down strap or electrical tape.
- (4) Install the two screws into the switch.
- (5) Place the knob on the switch shaft and tighten the setscrew. Take care to match the knob with information shown on the identification plate.
- (6) Connect wire leads. See figure 4-7, wiring diagram.
- (7) Carefully position the control panel in place and engage the 1/4 turn stud fasteners.
- (8) Reinstall the front and back panels.
- (9) Connect power.

**4-37. FRESH AND RETURN AIR LOUVER SWITCH 1
AND FRESH AND RETURN DAMPER ASSEMBLY**

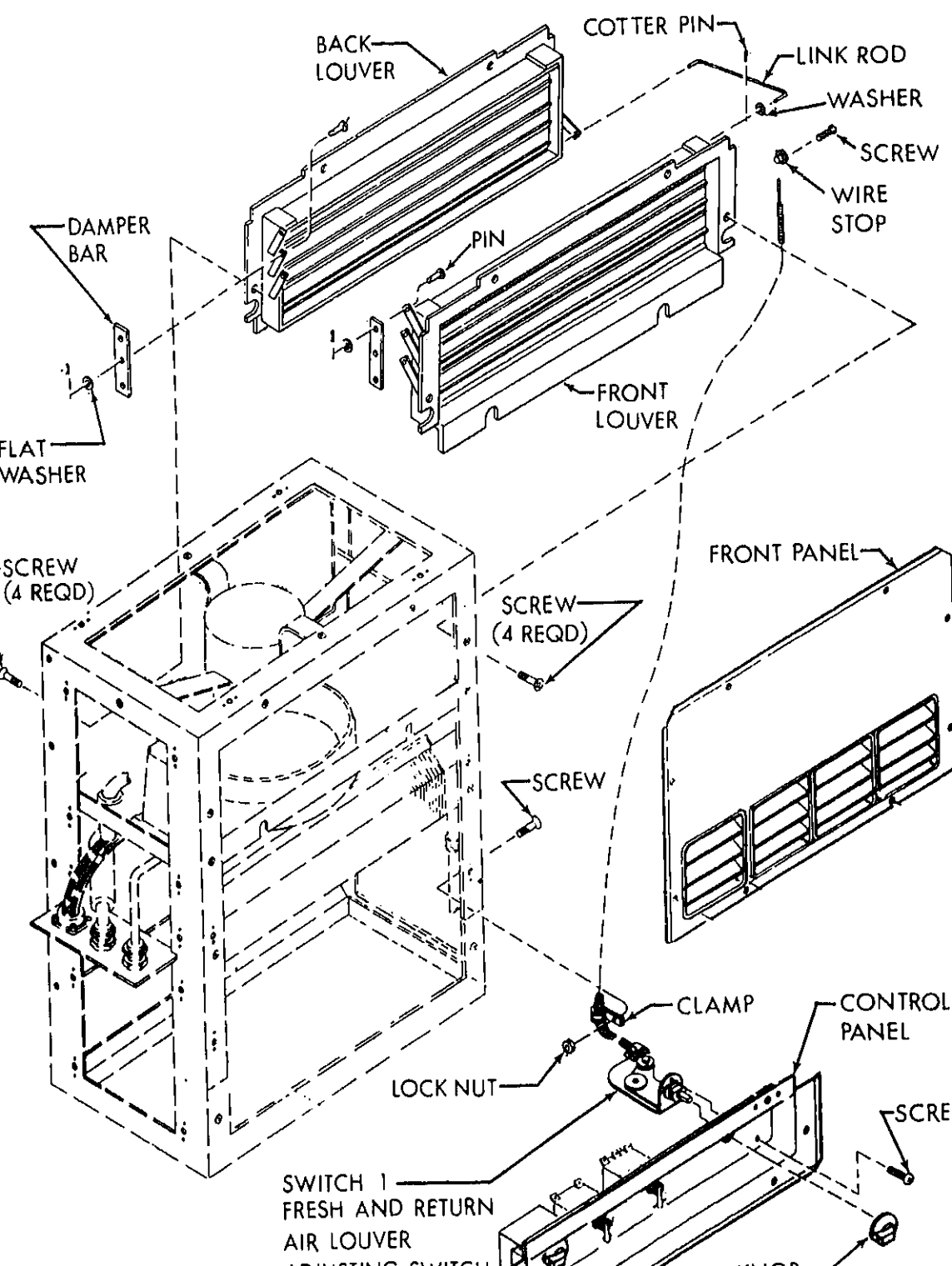
(figure 4-28).

WARNING

Disconnect power from the air conditioner before performing maintenance on internal components. The voltage used can be lethal.

a. Access.

- (1) Disconnect power.
- (2) Remove the following panels: top, right side, front, upper left and back. See figures 4



- (1) Inspect for loose, damaged or missing parts or hardware. Replace missing or defective parts and tighten loose hardware.
 - (2) Inspect louvers for dents, bent or broken blades, broken welds and proper operation when control switch is adjusted. Repair minor damage. Replace if damage hinders operation of louvers.
- c. Removal of adjusting switch.
- (1) Release the 1/4 turn stud fasteners and carefully pull the control panel out far enough to gain access to the parts on the back of the panel.
 - (2) Loosen the setscrew and remove the knob.
 - (3) Remove the screw and pull the switch from the control panel.
 - (4) Remove the screw, clamp and nut holding the control wire housing in place.
 - (5) Loosen the wire stop screw and remove the end of the wire from the wire stop.
 - (6) Remove the fresh and return air louver adjusting switch from the unit.

d. Removal of the louvers.

- (1) Remove the two cotter pins and washers from the link rod and remove the link rods.
- (2) Remove the four screws from each of the louvers and remove the louvers.

e. Cleaning.

WARNING

Dry cleaning solvent (Fed Spec P-D-680) used to clean parts is potentially dangerous to personnel and property. Do not use near open flame or excessive heat. Flash point of solvent is 100°F to 138°F (38°C to 59°C).

Clean the adjustable louvers and control switch with a dry cleaning solvent (Fed Spec P-D-680). Use brush if necessary to dislodge caked on dirt. Dry the parts thoroughly.

- f. Lubricate the louvers by applying a drop of oil on any surface where friction might develop. The maintenance required is an occasional drop of oil on these surfaces.

g. Reassembly/Installation.

- (1) Install both the front and back louvers with four screws each.
- (2) Slip the ends of the link rod into holes in the damper arm and retain with two each of the washers and cotter pins.
- (3) Position the fresh and return air louver adjusting switch in the unit.
- (4) Connect the end of the control wire to the front damper using a screw and wire stop.

- (9) Loosen the screw in the wire stop and the set screw in knob and adjust louvers so that the indication on the switch plate matches the knob pointer. Tighten the screw and set screw.
- (10) Install the following panels: top, right side, front, upper left and back.
- (11) Connect power.

-38. EVAPORATOR FAN

(figure 4-29).

a. Removal.

WARNING

Disconnect power from the air conditioner before performing maintenance on electrical components. The voltage used can be lethal.

- (1) Disconnect power.
- (2) Remove the following panels: top, right side and upper left. See figures 4-21 and 4-22.
- (3) Remove the two screws that attach the two larger motor supports to the sides of the evaporator frame.
- (4) Remove the four screws and the four lock washers that attach the two larger supports to the frame.
- (5) Remove the two screws securing the smaller motor supports to the frame, taking care to support the motor and fan assembly.
- (6) Carefully lift the motor and fan assembly out far enough to gain access to the set screw(s) in the motor shaft.
- (7) Loosen the set screw(s) and remove the fan.

WARNING

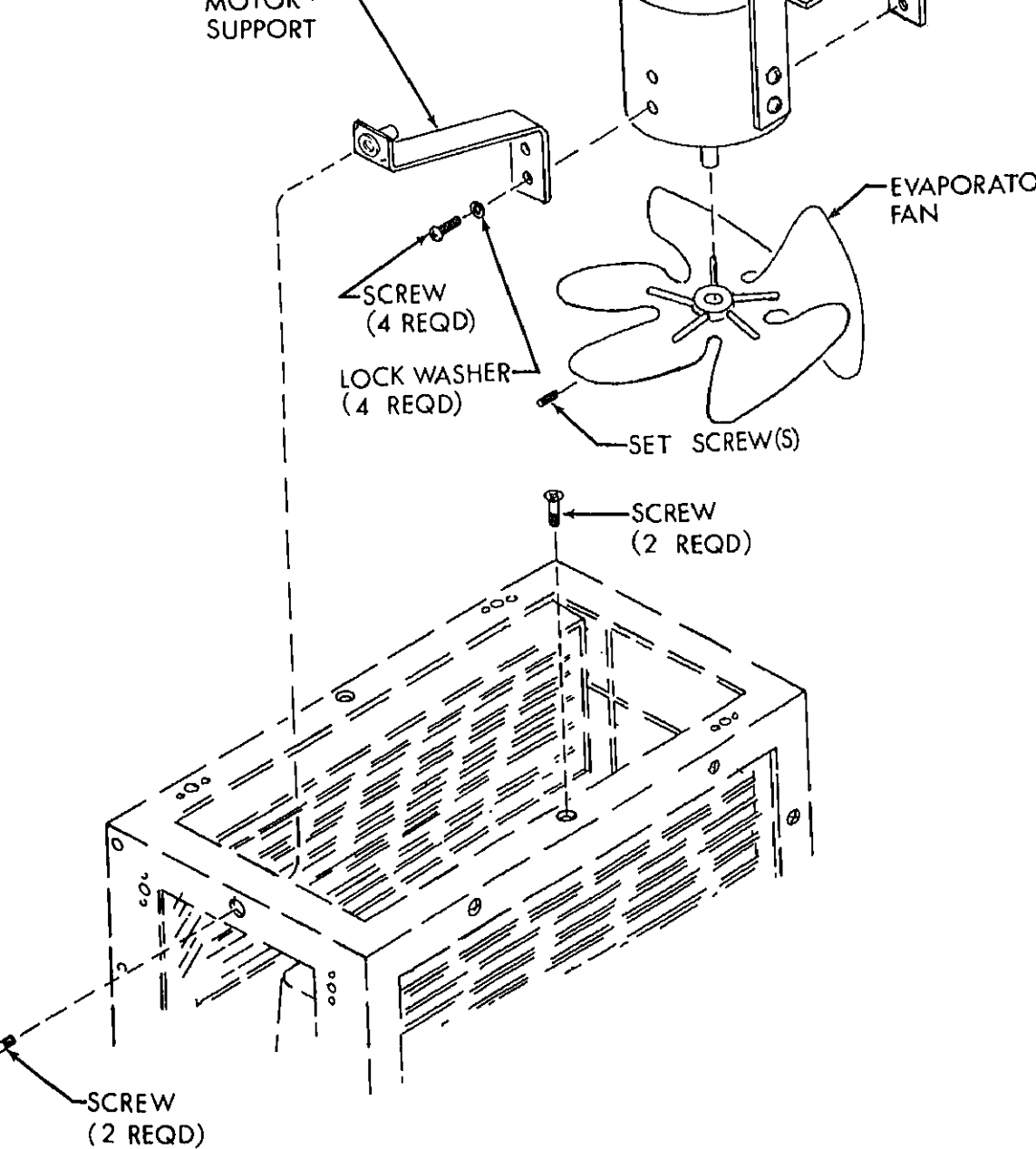
Dry cleaning solvent (Fed Spec P-D-680) used to clean parts is potentially dangerous to personnel and property. Do not use near open flame or excessive heat. Flash point of solvent is 100°F to 138°F (38°C to 59°C).

Cleaning. Wipe the fan blades with a clean cloth dampened slightly with dry cleaning solvent (Fed Spec P-D-680) and dry thoroughly.

Inspection. Check the fan for breaks, cracks, dents, loose rivets and bent or otherwise deformed blades. Replace the evaporator fan if it is defective.

Installation.

- (1) Slip the fan onto the motor shaft with the hub facing away from the motor. Align the screw(s) with the flat surfaces on the motor shaft. Tighten the set screw(s).



TS 4120-362-13/4-

Figure 4-29. Evaporator Fan.

fan shroud should be even. If necessary, loosen the screws that attach the motor supports to the frame and adjust the clearance.

-) Install the top, right side and upper left panels.
-) Connect power to unit.

EVAPORATOR FAN MOTOR

(figure 4-30).

WARNING

Disconnect power from the air conditioner before performing maintenance on electrical components. The voltage used can be lethal.

removal.

-) Disconnect power.
-) Remove the following panels: top, right side and upper left. See figures 4-21 and 4-22.

WARNING

Discharge capacitor before touching the two terminals.

-) Tag and disconnect motor leads from the capacitor and the relay.
-) Remove the two larger motor supports by removing two screws from each side of the frame and screws and lock washers from each end of the motor.
-) Remove the two remaining screws attaching the smaller motor supports to the frame, taking care to support the motor and fan assembly.
-) Carefully lift the motor and fan assembly out of the unit.
-) Remove the two smaller motor supports from the motor by removing four screws and four washers.
-) Loosen the set screw(s) and remove the fan.

WARNING

Dry cleaning solvent (Fed Spec P-D-680) used to clean parts is potentially dangerous to personnel and property. Do not use near open flame or excessive heat. Flash point of solvent is 100°F to 138°F (38°C to 59°C).

wires and free rotation of motor shaft. If a defect is found that could cause the unit to malfunction, replace the motor.

- 2) Check the fan for breaks, cracks, dents, loose rivets and bent or otherwise deformed fan blades. Replace the fan if it is defective.
- 3) Check the mounting brackets for breaks, cracks, dents and condition of threads in blind nuts. Repair minor damage using conventional sheet metal repair methods. Replace damaged blind nuts or mounting bracket if damage indicates replacement.

Testing.

- 1) Using a continuity tester, check for continuity between motor leads. If a lack of continuity is shown, an open winding is indicated. Replace the motor.
- 2) Check for continuity between the red lead and the motor frame. If there is continuity, one of the windings is shorted to ground. Replace the motor.

Installation.

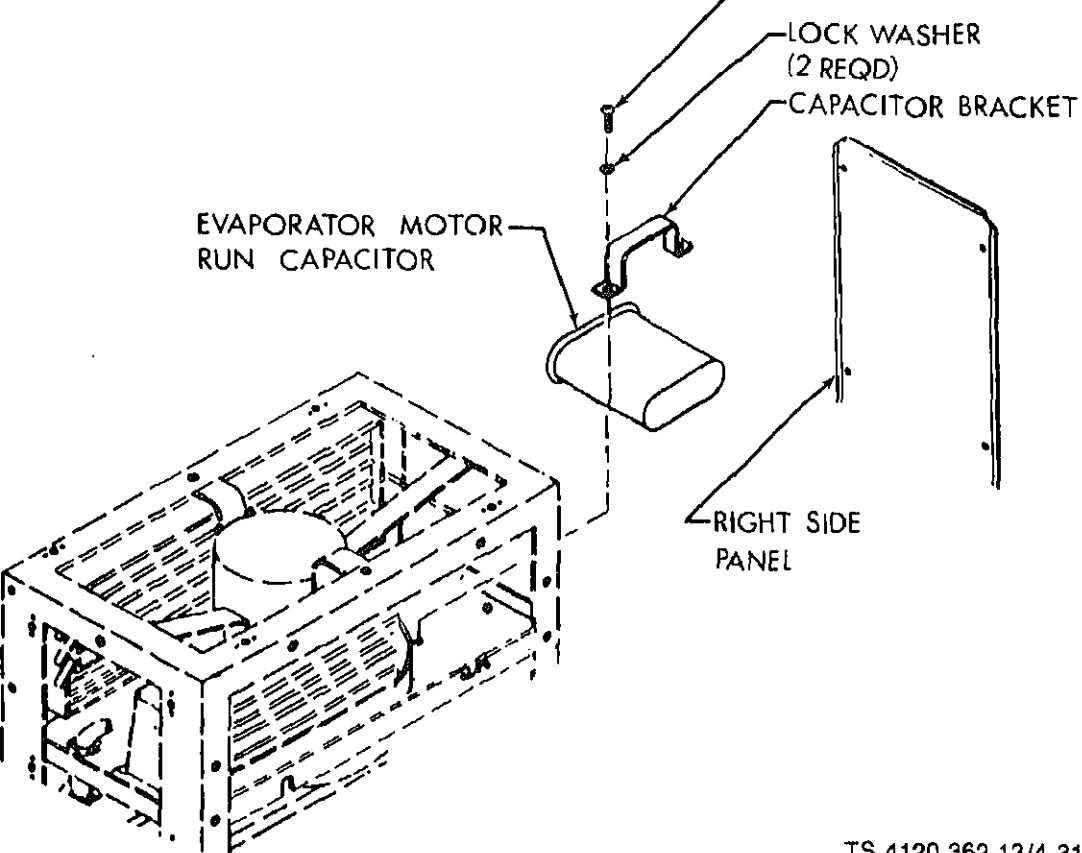
- 1) Install the two smaller motor supports using four each of the screws and lock washers. Take care not to strip the threads in the aluminum motor housing. Slip the fan onto the motor shaft with the hub facing away from the motor. Align the set screw(s) with the flat surfaces on the motor shaft. Tighten the set screw(s).
- 2) Carefully position the fan and motor assembly in the unit and install the two screws in the smaller motor supports.
- 3) Install the two larger motor supports by attaching two screws to the frame and four each of the screws and lock washers to the motor. Take care not to strip the threads in the aluminum motor housing.
- 4) Check the fan for clearance by spinning the fan by hand. Clearance between the blade tips and fan shroud should be even. If necessary, loosen the screws that attach the motor supports to the frame and adjust the clearance.
- 5) Connect the motor leads to the relay and capacitor. See tags on removed motor and also see wiring diagram, figure 4-7.
- 6) Install the top, right side and upper left panels.
- 7) Connect power to unit.

EVAPORATOR FAN MOTOR RUN CAPACITOR

(figure 4-31).

WARNING

Disconnect power from the air conditioner before performing maintenance on electrical components. The voltage used can be lethal.



TS 4120-362-13/4-31

Figure 4-31. Evaporator Fan Motor Run Capacitor.

removal.

Disconnect power.

Remove the right side panel.

WARNING

Discharge capacitor before touching the two terminals.

Tag and disconnect the leads.

Remove two each screws and lock washers and remove the capacitor bracket.

Remove the capacitor.

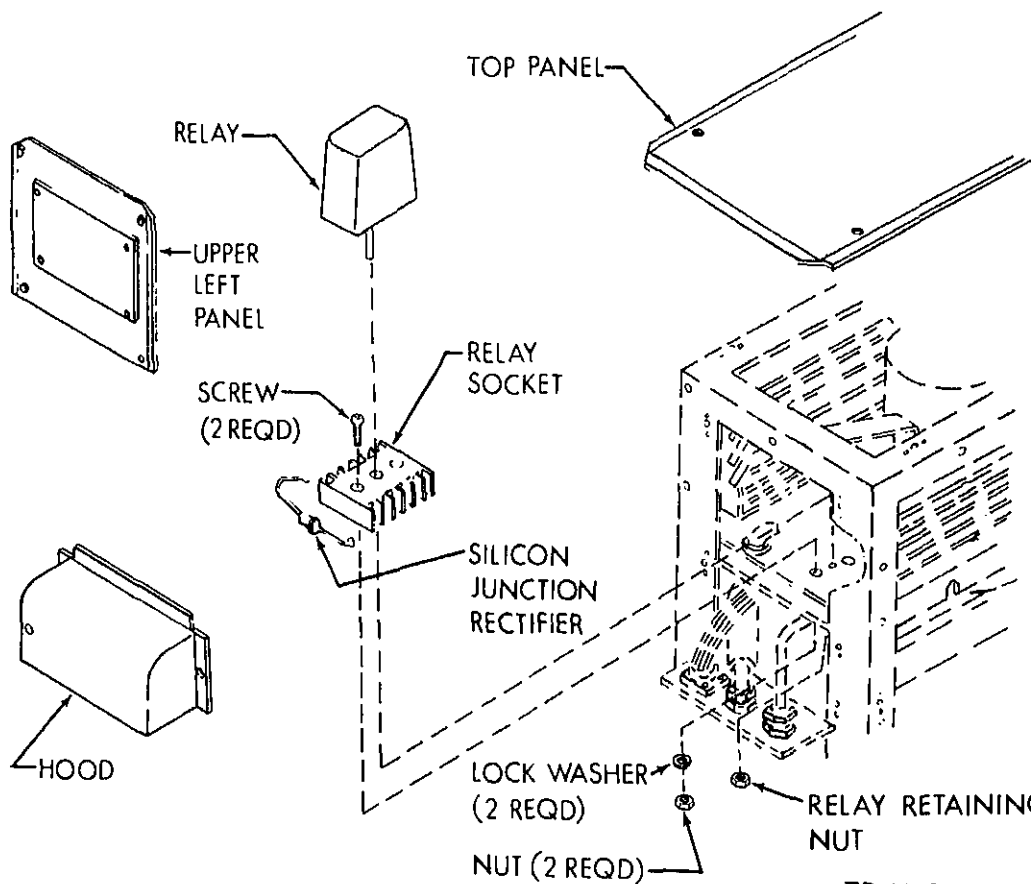
- (1) Position the capacitor.
- (2) Connect the leads. See figure 4-7, wiring diagram.
- (3) Install the right side panel.
- (4) Connect power to the unit.

4-41. POWER RELAY (EVAPORATOR SECTION)

The power relay is capable of switching 10 amperes per min. at 115 V ac. It is mounted on the evaporator guard. See figure 4-32.

WARNING

Disconnect power from the air conditioner before performing maintenance on electrical components. The voltage used can be lethal.



Removal. Remove the relay retaining nut and pull the relay up and out of the unit.

Inspection. Inspect for cracks, corrosion, loose electrical connections and loose mounting hardware. Repair and tighten loose electrical connections and tighten loose mounting hardware. Replace cracked, broken or badly corroded parts.

Testing. Touch the probes of a continuity tester to pins 6 and 7. If a lack of continuity is indicated, replace the relay.

Installation.

- (1) Carefully align the relay pins with the relay socket. Press the relay firmly into the socket and secure with relay retaining nut.
- (2) Install the hood and the top and upper left panel.
- (3) Connect power to the unit.

2. SILICON JUNCTION RECTIFIER (EVAPORATOR SECTION)

CR2 silicon junction rectifier, is wired to pins 6 and 7 of the power relay socket terminals. This rectifier prevents radio frequency interference (RFI) spikes from entering the power circuit. See figure 4-32 and wiring diagram, figure 4-7.

WARNING

Disconnect power from the air conditioner before performing maintenance on electrical components. The voltage used can be lethal.

Access. Disconnect power and remove the upper left panel.

Testing.

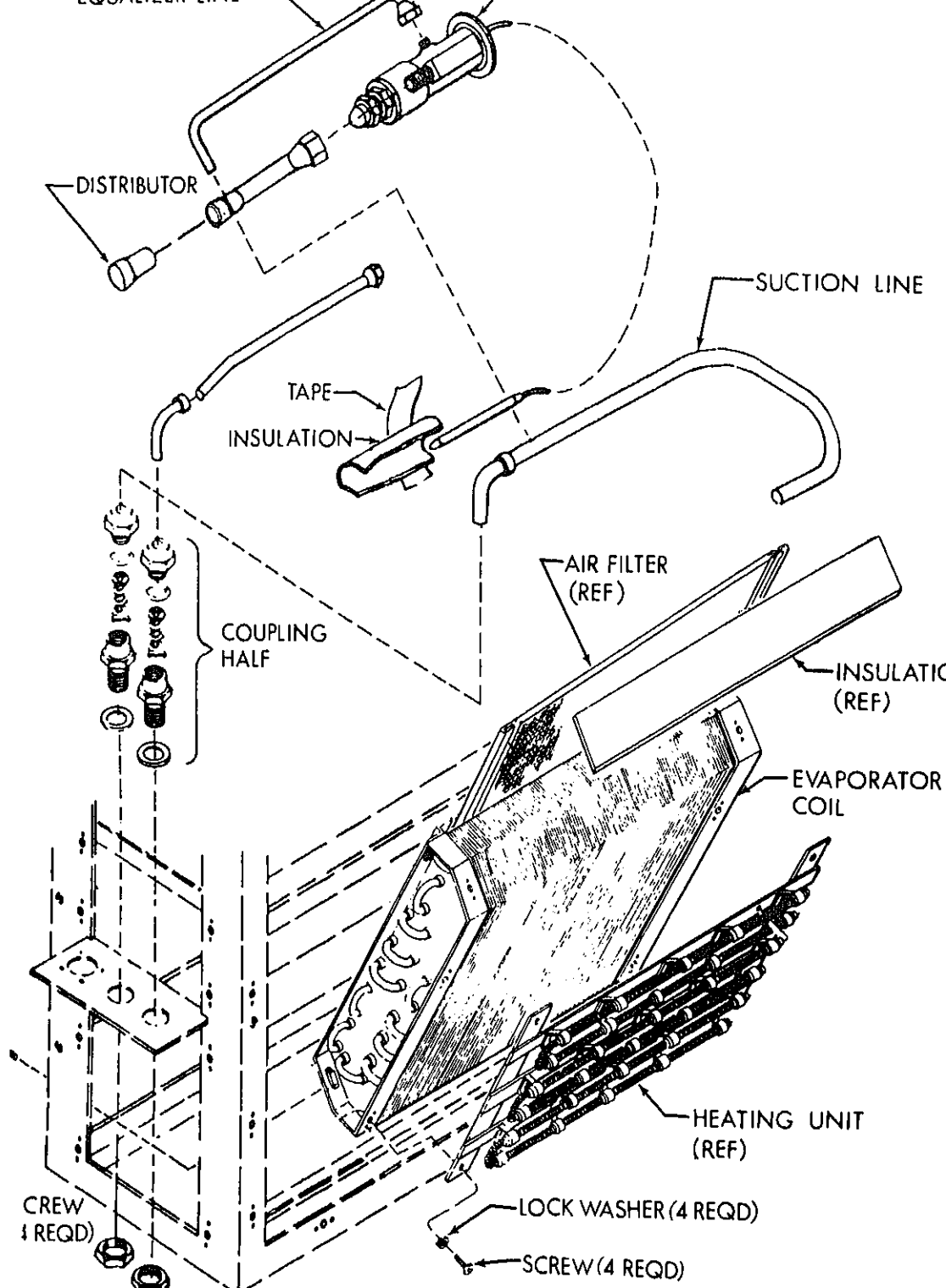
- (1) Disconnect one lead of the rectifier from either terminal 6 or terminal 7 of the power relay socket terminals.
- (2) Using an ohmmeter, place a probe on each of the rectifier leads and take a reading. There should be a high reading in one direction and a low reading in the other direction. Replace if defective.

Installation.

- (1) When a silicone junction rectifier must be replaced install heat shrink tubing and terminate the rectifier leads.
- (2) Connect the rectifier to terminals 6 and 7 of the relay socket. See wiring diagram figure 4-7 for proper input-output connections.
- (3) Install the upper left panel and connect power to unit.

43. REFRIGERANT PIPING (EVAPORATOR SECTION)

(figure 4-33).



CAUTION

The electronic leak detector is sensitive to the presence of refrigerant gas in atmosphere. When refrigerant gas is present in the atmosphere of the work area, false indications can result. Use in a well ventilated but draft free area.

- (1) Electronic Leak Detector. Turn the electronic unit on, and slowly pass the probe around all points of the refrigerant system at which a leak could exist. Depending upon the type of detector used, a leak will be indicated by an audible signal, a light, or by meter deflections.
 - (2) Soap Solution. Brush soap solution on all possible points of leakage, and watch for bubbles. Follow a definite sequence to avoid missing any points that should be tested. Wipe the solution from the joints, and mark any point at which a leak is found.
- c. Replacement. If test results show any leaks, mark the location and report to direct support maintenance.

44. EXPANSION VALVE (EVAPORATOR SECTION)

(figure 4-33).

The expansion valve is located in the lower right area of the evaporator section. It controls refrigerant flow through the evaporator coil.

- a. Access. Remove the right side and back panels. See figures 4-21 and 4-22.
- b. Inspection/Test of Installed Items.
 - (1) Inspect for evidence of leaks, kinked or otherwise damaged capillary line, and loose or missing expansion valve stem cap.
 - (2) Check thermal bulb to see that it is securely clamped to the suction line.
 - (3) If a leak is suspected or indicated, test per paragraph 4-43c.
- c. Replacement. If inspection/test results indicate replacement, refer to direct support maintenance.
- d. Replacement. If inspection/test results indicate replacement, refer to direct support maintenance.
- e. Install the right side and back panels.

45. AIR FILTER (EVAPORATOR SECTION)

The air filter, located in the evaporator section, traps dust, dirt and other airborne debris. See figure 4-34.

- a. Removal.
 - (1) Remove the front panel.
 - (2) Slide the air filter up and out of the side clips located on the top side of the evaporator coil.

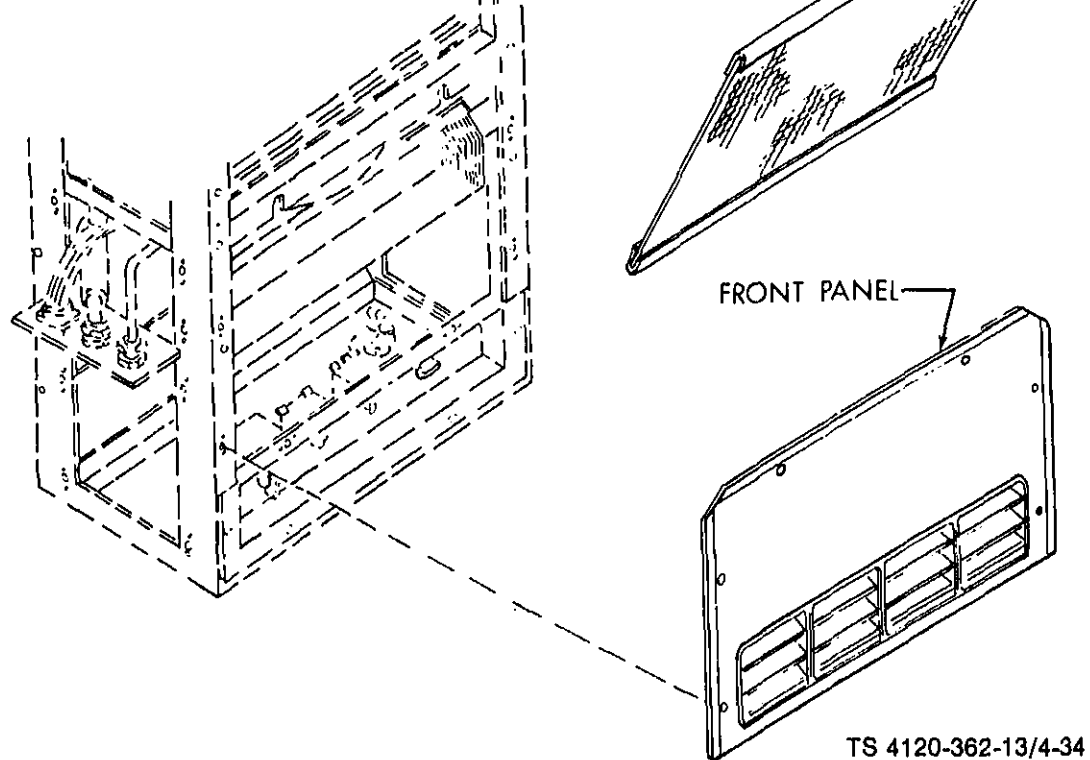
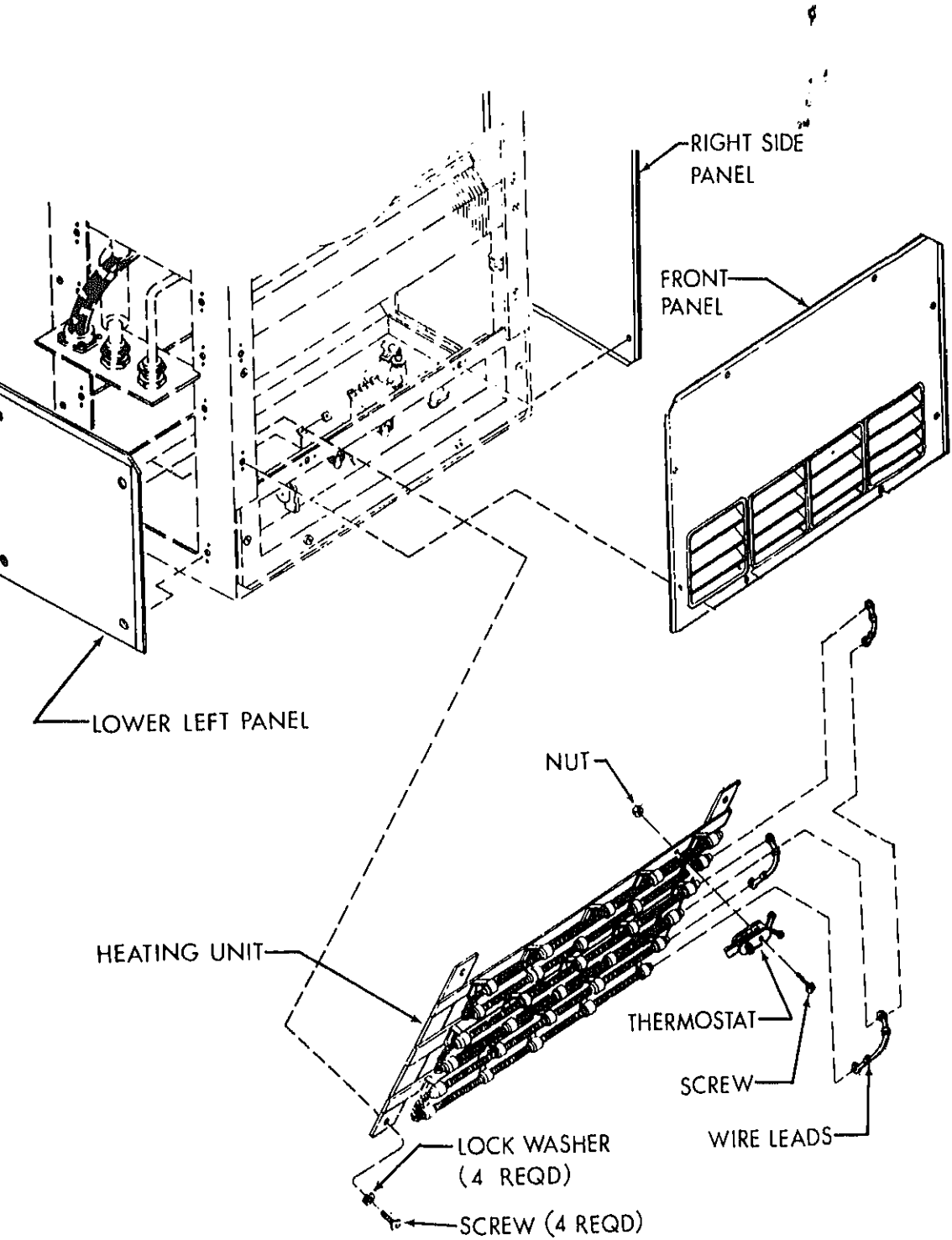


Figure 4-34. Air Filter, Evaporator Section.

WARNING

Dry cleaning solvent (Fed Spec P-D-680) used to clean parts is potentially dangerous to personnel and property. Do not use near open flame or excessive heat. Flash point of solvent is 100°F to 138°F (38° to 59°C).

- b. **Cleaning.** Immerse the filter in detergent solution or dry cleaning solvent (Fed Spec P-D-680). Agitate till dirt is removed, using a soft brush if necessary to loosen caked-on dirt. Rinse in clear water or clear dry cleaning solvent. Allow filter to dry completely.
- c. **Inspection.** Inspect the filter for damage such as perforations or punctures in the screen and aluminum foil maze that could permit passage of unfiltered air. Inspect for areas of packed or crushed maze material that would obstruct airflow through the filter. Check for deformation of the frame, and straighten if possible without crushing maze material. Replace filter if crushed, punctured, badly deformed or broken.
- d. Carefully slide the air filter down into the side clips located on the top side of the evaporator coil.
- e. Install the front panel.



Access.

- (1) Disconnect power.
- (2) Remove the following outside panels: front, right side, and lower left side.

Inspection/Test of installed items.

- (1) Inspect the heater coils for broken elements, cracked or broken insulators, excessive corrosion, loose or broken mounting strips. If any of these conditions exist replace the heating unit.
- (2) Inspect the heater overtemperature protector thermostat for pitted contacts, excessive corrosion, cracked or broken body parts. If any of these conditions exist, replace the thermostat.
- (3) Check the heater and the thermostat for loose or missing hardware. Replace or tighten hardware as indicated.
- (4) Use a continuity tester and check heater coil continuity by touching the probes to each end of heater coil. If continuity is not indicated, it is defective and must be replaced.

WARNING

The power supply must be connected for the following tests. Take the necessary safety precautions.

c. Testing of installed items.

- (1) Connect the power supply.
- (2) Place switch SW2 in the ON position. Place switch SW3 in the HEAT position.
- (3) With a voltmeter, check the voltage to the heater coil terminals and the heater overtemperature protector thermostat for 115 volts, nominal. If the nominal 115 volts is not recorded, check for proper connection with the power supply, switches or wiring to the heater. See wiring diagram, figure 4-7.
- (4) If 115 volt power is recorded at the thermostat but not at the heater, replace the thermostat.

d. Removal.

- (1) Disconnect power.
- (2) If heaters have been operated, let the unit cool down.
- (3) Tag and disconnect electrical leads to heater and thermostat.
- (4) Remove four screws and four lock washers and carefully remove the heater and thermostat assembly from the unit.
- (5) Remove the screw and nut from the thermostat and remove the thermostat.

cleaning.

Using a clean, dry cloth or a soft brush, carefully clean heater and thermostat.

Repair or replacement. Repairs, other than minor repairs of the mounting frame of the heater, are not advised. Should any of the test or inspection results so indicate, the heater or the thermostat should be replaced.

Installation.

- (1) Install the thermostat using a screw and nut.
- (2) Carefully mount the heater assembly to the evaporator coil flanges using four screws and four washers.
- (3) Connect the electrical leads. Refer to the tags added when wires were removed and the wiring diagram (figure 4-7).
- (4) Install the front, right side and lower left side panels.
- (5) Connect power to the unit.

7. EVAPORATOR COIL

The evaporator coil consists of copper tubing with aluminum fins. It removes heat from the air and transfers it to the refrigerant. See figure 4-33.

Access. See figures 4-21 and 4-22 and remove the following panels: front, right side, lower left side and back.

Inspection/Test of Installed Items.

- (1) Check for accumulated dirt. Clean if an accumulation of dirt is evident.
- (2) Check fins for dents, bent edges or any condition that would block or distort air flow. Straighten damaged fins with a plastic fin comb.
- (3) If a leak is indicated, test per paragraph 4-19c.

WARNING

Compressed air used for cleaning purpose will not exceed 30 PSI.

Cleaning. Clean coil with a soft bristled brush, or use compressed air at 30 psi or less from the inside of the coil to blow the dirt out. Take care to avoid fin damage.

Repair/Replacement. If inspection/test results indicate repairs or replacement, refer to direct support maintenance.

Install the following panels: front, right side, lower left side and back.

-) Check for missing, loose or damaged hardware. Replace all hardware found missing or defective.
-) Inspect for dents, bends and cracked or broken welds. Refer defective condition to direct support maintenance.
- Repair. Refer all repairs other than hardware replacement to direct support maintenance.
- Install all panels and the hood. See figures 4-21 and 4-22.

Section VI.

PREPARATION FOR STORAGE OR SHIPMENT.

See TM740-90-1 for Administrative Storage of Equipment.



Maintain the units in a vertical position at all times.

Intermediate. No special handling is required for Intermediate storage other than protection from damage and the elements.

Long term storage or preparation for shipment by air. When the unit is to be moved a considerable distance, it is advisable to pump down the refrigerant charge into the receiver. Proceed as follows:

- 1) Remove cap from refrigerant valve stem located on receiver immediately behind condenser air intake grille.
- 2) Turn valve stem clockwise as far as it will go.
- 3) Turn SW4 to coldest setting and set SW3 to COOL.
- 4) Turn SW2 to ON and observe sight glass. Bubbles will soon appear. Continue operating compressor until bubbling diminishes and almost disappears. A slight amount of colorless liquid refrigerant will be noticed as well as a little oil. Just before bubbling and liquid refrigerant disappears entirely, turn SW2 to OFF to shut off unit.
- 5) Disconnect the power supply cable.
- 6) Remove the interconnecting cable and refrigerant hoses.
- 7) Remove the floor or wall mounting hardware and drain connections.
- 8) Crate the unit, utilizing base mounting bolts, to secure sections to base of crate or skid.
- 9) Pack hoses and cables in crates with unit to avoid loss.
- 10) Fill voids in crate with shock absorbing material. Do not use material that may clog condenser or evaporator coils.
- 11) Include warning tag with shipment indicating necessity for opening receiver valve prior to operation of the unit.

General Information	I
Tools and Lists	5-1
Maintenance Instructions	II
Refrigerant Hoses	5-2
Refrigeration Component and System	
Repair General	5-3
Pressure Switch (Condenser Section)	5-4
Refrigerant Piping (Both Sections)	5-5
Service Valve (Condenser Section)	5-6
Couplings (Both Sections)	5-7

Compressor (Condenser Section)
Sight Glass (Condenser Section)
Filter-Drier (Dehydrator) (Condenser
Section)
Receiver (Condenser Section)
Condenser Coil
Expansion Valve (Evaporator Section)
Evaporator Coil
Frame (Both Sections)

Section I.

GENERAL INFORMATION.

TOOLS AND LISTS

For authorized common tools and equipment, refer to the Modified Table of Organization and Equipment (MTOE) applicable to your unit.

No special tools are required for maintenance of the equipment. Test, maintenance and diagnostic equipment (TMDE) and support equipment include standard pressure and vacuum gages, vacuum pump, charging manifolds found as standard equipment in any refrigeration shop.

Repair parts are listed and illustrated in the Repair Parts and Special Tools (RPSTL) lists 4120-362-23P covering organizational and direct support maintenance for this equipment.

Section II.

MAINTENANCE PROCEDURES.

REFRIGERANT HOSES

Section/test results shown in paragraph 4-9a indicate replacement of the refrigerant hoses, replace as indicated per the following instructions.

Removal. See figure 4-6.

- 1) It is normally not necessary to discharge the refrigerant to replace the hoses. Both the fittings on the unit and the fittings on the hose ends are equipped with poppet valves that close when the hoses are disconnected.
- 2) Remove the hood and upper panel above the hood from both sections.

- (3) Use two wrenches, one to hold the hex portion of the half coupling body located directly mounting angle on the unit, the other to loosen the hose assembly end from the unit. If the be reused, do not allow it to kink or twist.

b. Installation.

- (1) Use two wrenches, one to hold the hex portion of the half coupling body located directly mounting flange on the unit, the other to tighten the hose assembly end to approximate pounds (47.8 newton meters) of torque.

CAUTION

Do not allow the fitting on the unit to turn. Avoid kinking or twisting the hose.

- (2) Install the hoods and upper panels on both sections.

5-3. REFRIGERATION COMPONENT AND SYSTEM REPAIR GENERAL

The following instructions will apply to most all refrigeration item repair and replacement procedures. Individual component listings for step-by-step removal and replacement instructions.

a. Releasing the refrigerant charge.

WARNING

DANGEROUS CHEMICAL

is used in this equipment

DEATH

or severe damage may result if personnel fail to observe safety precautions. Use great care avoid contact with liquid refrigerant or refrigerant gas being discharged under pressure. Sudden and irreversible tissue damage can result from freezing. Wear thermal protective gloves and a face protector or goggles in any situation where skin or eye contact is possible.

Prevent contact of refrigerant gas with flame or hot surfaces. Heat causes the refrigerant break down and form carbonyl chloride (phosgene), a highly toxic and corrosive gas.

- (1) Remove the intake air grille from the condenser section. See figure 4-8.
- (2) Remove valve cap from receiver valve stem.
- (3) Back seat the receiver valve by turning the valve stem counterclockwise until it stops.
- (4) Remove flare cap from the receiver valve.

Do not permit the oil to escape from the unit. If oil is escaping, close the valve slightly.

Do not permit the refrigerant to escape fast enough to form ice or frost on either the lines or the valve.

Leak Test of an uncharged system.

- 1) Remove the valve cap from the receiver valve stem.
- 2) Turn valve stem counterclockwise until it stops.
- 3) Remove flare cap from the receiver valve.
- 4) Connect refrigerant R-12 source to gage valve port. Turn valve clockwise one turn. Allow refrigerant to build up pressure to 50 psig. (3.52 kgm/cm²).
- 5) Turn valve stem counterclockwise until it stops. Disconnect refrigerant line and connect line from regulated dry nitrogen source to the removable frame angle.
- 6) Remove the two screws and lock washers holding the valve to the bracket.

Installation (figure 4-16).

- 1) Assemble the service valve to the bracket with two each screws and lock washers.
- 2) Install the valve and bracket assembly to the removable frame angle with two each screws and nuts.
- 3) Connect and tighten the flare nuts connecting the tubing to the service valve.
- 4) Leak test the valve and newly connected tubing in the area of the valve in accordance with paragraph 5-3b.
- 5) Evacuate the system in accordance with paragraph 5-3c.
- 6) Charge the system in accordance with paragraph 5-3d.
- 7) Install the rear panel.
- 8) Connect power to the unit.

Turn valve stem one turn clockwise and allow nitrogen to build up to 300 psig. Turn valve stem counterclockwise until it stops.

- 9) Test for leaks using one or both of the following methods:



The electronic leak detector is sensitive to the presence of refrigerant gas in the atmosphere. When the refrigerant gas is present in the atmosphere of the work area, false indications can result. Use in a well ventilated but draft free area.

from all joints, and mark any joint at which a leak is found.

- (10) Release the test charge.

Evacuating the system.

- (1) If the intake grille on the condenser section is in place, remove it. (figure 4-8).
- (2) Remove receiver valve stem cap.
- (3) Remove gage port cap from receiver valve.
- (4) Connect refrigerant compound gage to the gage port of valve with charging hose.
- (5) Connect the second hose of refrigerant gage manifold to suction side of vacuum pump.
- (6) Open charging valve on receiver; then start vacuum pump. Open valve on gage manifold.
- (7) Evacuate system for 30 minutes. Gage indication should be at least 28 inches of mercury.
- (8) Close valve on compound gage manifold. Stop vacuum pump and remove hose.
- (9) Connect hose for R-12 drum and open drum valve. Loosen hose fitting on gage manifold and R-12 vapor to sweep thru hose.
- (10) Tighten hose fitting on manifold, open manifold valve. Open receiver valve and admit R-12 vapor until gage reads 15 pounds (1.1 kgm/cm²) positive pressure.
- (11) Close drum valve and manifold valve and reconnect hose to vacuum pump. Start pump, manifold valve and evacuate for 30 minutes. Repeat steps 6 thru 10 three times. On final evacuation run vacuum pump for one hour.

NOTE

Check bullseye in sight glass after final evacuation. Color should be pure green. If there is a tint of yellow, repeat steps 6 thru 10 until color is pure green.

NOTE

Allow unit to remain on vacuum for 15 minutes. If vacuum holds, system is ready for charging. If vacuum does not hold, check for leaks in system.

Charging the system.

- (1) Evacuate the system. Refer to paragraph 5-30c.
- (2) Bleed the charging equipment as follows:
 - (a) Connect metered refrigerant charging bottle to drum of R-12.
 - (b) Connect outlet of charging bottle to gage manifold by means of the charging hose.

- (e) Tighten fitting on inlet to metered bottle and open inlet valve slightly.
- (f) Open vent valve on charging bottle and allow R-12 vapor to sweep through bottle.
- (g) Close vent, close inlet valve. Open outlet valve and loosen hose fitting on gage manifold.
- (h) Open inlet valve to metered bottle and allow R-12 vapor to sweep through inlet hose bottle and outlet hose to gage manifold.
- (i) Tighten hose connections to manifold valve, shut outlet valve from metered bottle.
- (j) Invert R-12 drum and feed 2.5 lbs. of liquid refrigerant into metered bottle (opening the vent valve very slightly will facilitate this process).
- (k) Close inlet valve to metered bottle and valve vent.

NOTE

Make sure that the bottle contains 2.5 lbs. of refrigerant. If necessary, place slightly more than 2.5 lbs. in bottle and bleed off excess through vent.

- (l) When charging direct from a drum of refrigerant, first weigh the drum and observe the weight during the charging operation taking care to stop when 2.5 lbs. of refrigerant has been used.

Charge the system as follows:

- (a) Remove cap, turn suction valve stem clockwise until it stops and connect hose from manifold suction gage.
- (b) Connect hose from manifold discharge gage and purge air from both the suction and discharge gage hoses. Open metered bottle outlet valve, manifold valve to the discharge gage and receiver valve to allow refrigerant to enter system 1.5 lbs will enter readily.
- (c) To charge remainder of refrigerant into system, front seat (clockwise) receiver valve and close discharge gage manifold valve. Operate compressor until discharge gage indicates 5 psig. Open gage manifold valve. Remainder of refrigerant should flow into system. If not, shut off manifold valve and operate compressor until gage indicates 5 psig. Stop compressor and open manifold valve. Repeat as often as necessary to charge entire 2.5 lbs into system.



Do not charge liquid refrigerant into the suction service valve. Damage to the unit will result.

Backseat the receiver valve. Close all valves in charging system and remove hose fitting from receiver valve. Replace stem cap and gage port cap.

Brazing/Debrazing techniques.

The refrigeration system must be completely discharged before removing any part of the system. If any refrigerant is introduced through the

from the joint, sometimes melting an adjacent joint at the same time.
Cleaning. Residual filler metal can be removed from a debrazed tube in the following manner.

WARNING

Wear welders' gloves or other thermal protective gloves when performing the following operation.

- (a) Fold a piece of fiberglass cloth about 6 x 6 inches and wrap it loosely around the tubing, a few inches away from the tubing end to be cleaned.
 - (b) Heat the tubing at the end to be cleaned until the braze filler metal is thoroughly melted.
 - (c) Grasp the fiberglass wrapping firmly, and pull it over the tubing end with a twisting motion.
-) Protection from heat.

WARNING

Polyurethane foam insulation breaks down to form toxic gases when heated to brazing temperature.

- (a) When brazing/debrazing refrigerant tubing or fittings near an insulated wall of the air conditioner, use a nonheat conductive shield to deflect the flame of the torch away from the insulation. Perform the operation in a well ventilated area.
- (b) When brazing/debrazing tubing from expansion valves, solenoid valves or other components that could be warped or damaged by brazing temperature, the component should be disassembled to the extent possible, and the body alone brazed/debrazed. If disassembly is impractical or impossible, the entire component, except for the joints to be heated, should be wrapped in wet cloth to act as a heat sink.

) Types of filler alloy (solder).

- (a) Phos-copper. The entire joint area must be as clean as possible. If tubing must be cut to make repair, the cut end must be reamed both inside and out.

CAUTION

Use extreme care to prevent contamination of refrigerant system with dirt, moisture, metal chips, flux or other foreign particles.

Parts to be joined should be close fitted, approximately 0.003 inch clearance. Copper to copper joints will require no flux, but all other metals will require the use of an approved flux. The

pass the rod to flow evenly into the joint. Avoid overheating and remelting. To remove surplus flux, wipe with a cloth saturated with hot water.

When making joints in areas close to the sight glass, valves or hose fittings, a heat sink *must* be provided to prevent the transfer of heat into areas which may be damaged by extremely high temperatures.

If care is used to prevent moisture from entering the system, such a heat sink may be made from a cloth soaked in water and wrapped around the temperature sensitive part.

- (b) **Silver Brazing Alloys.** Although the phos-copper joints are acceptable in most instances, a more dependable joint can be made with silver brazing alloy with a high silver content. It is especially recommended to joint dissimilar metals and for use in joints subject to vibration. Clean all joints thoroughly of all oxides, dirt and grease. Maintain 0.009 inch maximum clearance between tube and fitting. Cover the joint surfaces with an approved flux before brazing.

CAUTION

Be careful not to allow the flux to contaminate the system.

Heat the joint uniformly with *neutral flame* and *broad heat* until the flux is liquid. Apply the rod to the joint and keep flame moving. Excess flux may be removed by wiping with a cloth saturated in hot water.

PRESSURE SWITCH (CONDENSER SECTION)

Paragraph 4-17 for operational check, inspection and cleaning instructions.

Replacement. (figure 4-14).

WARNING

Disconnect power from the air conditioner before performing maintenance on electrical components. The voltage used can be lethal.

- 1) Disconnect power.
- 2) Remove the top, upper right and rear panels.
- 3) Release the refrigerant in accordance with instructions in paragraph 5-3a.
- 4) Debraze the end of the capillary line from the tee in accordance with instructions in paragraph 5-3e.
- 5) Tag and disconnect wire leads.
- 6) Remove the two screws holding the bracket to the frame and remove the pressure switch and bracket from the unit.
- 7) Remove the two screws and lock washers holding the bracket to the switch.

- (3) Carefully form the capillary tubing so that the capillary from which the old capillary was removed. Coil the slack capillary tubing into a 3 inch (7.62) diameter or larger coil and tape to a nearby tube or other rigid support.
- (4) Braze the end of the capillary into the tee in accordance with instructions in paragraph 5-3e.
- (5) Connect the wire leads. See figure 4-7, wiring diagram.
- (6) Leak test the refrigeration piping in the area of the newly brazed joint in accordance with paragraph 5-3b.
- (7) Evacuate the system in accordance with paragraph 5-3c.
- (8) Charge the system in accordance with paragraph 5-3d.
- (9) Install the top, upper right and rear panels.
- (10) Connect power to the unit.

5-5. REFRIGERANT PIPING (BOTH SECTIONS)

For access, inspection of installed items, and testing, see paragraph 4-19 for condenser section piping and paragraph 4-43 for evaporator section piping.

- a. Repair/Replacement.

WARNING

Disconnect power from the air conditioner before performing maintenance on internal components. The voltage used can be lethal.

- (1) Disconnect power.
- (2) Release the refrigerant in accordance with instructions in paragraph 5-3a.
- (3) Debraze the leaking or damaged joints in accordance with instructions in paragraph 5-3e.
- (4) If a fitting or section of tubing is defective, replace it.
- (5) Braze the tubing or fitting connections in accordance with instructions in paragraph 5-3e.
- (6) Leak test the refrigeration piping in the area of newly brazed joints in accordance with paragraph 5-3b.
- (7) Evacuate the system in accordance with paragraph 5-3c.
- (8) Charge the system in accordance with paragraph 5-3d.
- (9) Install outside panels.
- (10) Connect power to the unit.

paragraph 4-20 for inspection/test of installed items.

Replacement (figure 4-16).

WARNING

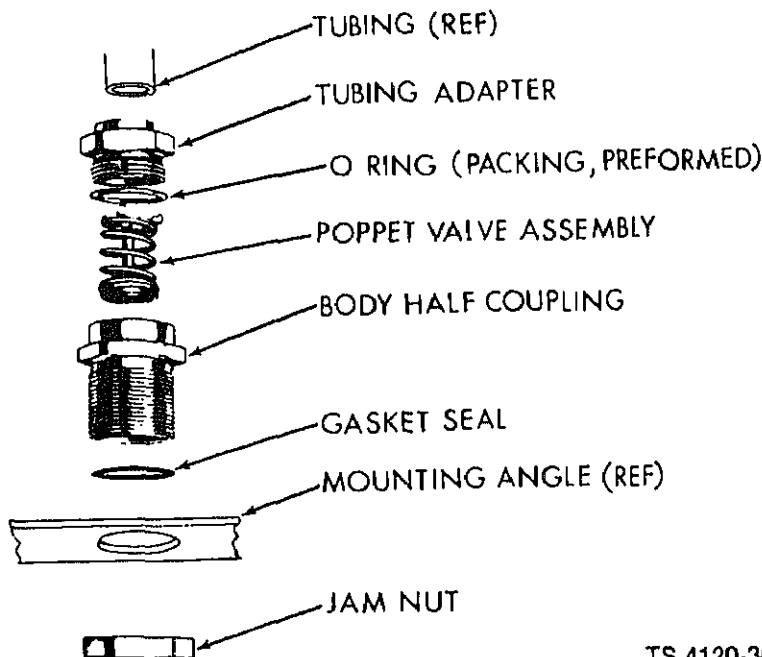
Disconnect power from the air conditioner before performing maintenance on internal components. The voltage used can be lethal.

- 1) Disconnect power.
- 2) Remove the rear panel.
- 3) Release the refrigerant in accordance with instructions in paragraph 5-3a.
- 4) Loosen the flare nuts connecting the tubing to the service valve.
- 5) Remove the two screws and lock nuts holding the valve bracket.

HALF COUPLINGS (BOTH SECTIONS)

paragraph 4-21 for inspection of installed items.

Repair or Replacement. See figure 5-1. All repairs other than tightening of screw joints will require assembly and replacement of some parts. When the half couplings are disassembled for any reason, O-rings and gaskets should be replaced.



(2) Release the refrigerant in accordance with instructions in paragraph 5-3a.

(3) Remove the hose. Use two wrenches to avoid damage to the tubing connections. Use one wrench hold the hex portion of the half coupling body located directly above the mounting angle on the unit and the other to loosen the hose assembly end. Take care to avoid kinking and excessive twisting of the hose.

(4) Use two wrenches. Using one wrench to hold the valve body, remove the jamnut.

(5) Use two wrenches. Using one wrench to hold the tubing adapter, carefully remove the valve body. Carefully spring tubing up enough to remove the half coupling body, the poppet valve assembly and the O-ring.

(6) Inspect the tubing adapter for cracks and damaged threads. If defective, debraze the tubing adapter in accordance with instructions in paragraph 5-3e.

b. Installation. See figure 5-1.

(1) If the tubing adapter was removed, braze a new one in place in accordance with instructions in paragraph 5-3e.

(2) Slip the poppet valve assembly and O-ring into place in the half coupling body. Carefully engage the threads of the half coupling body and the tubing adapter.

(3) Use two wrenches. Use one wrench to hold the tubing adapter and the other to tighten the half coupling body to approximately 35 foot pounds (47.8 newton meters) of torque.

(4) Carefully slip the threaded portion of the half coupling body through the hole in the mounting angle. Hold the hex on the half coupling body in place with a wrench and tighten the jam nut.

(5) Use two wrenches, one to hold the hex portion of the half coupling body located directly above the mounting flange on the unit, and the other to tighten the hose assembly end to approximately 35 foot pounds (47.8 newton meters) of torque.

CAUTION

Do not allow the fitting on the unit to turn. Avoid kinking or twisting the hose.

(6) Leak test the refrigerant fittings and hose in the area of the newly installed half coupling and hose in accordance with paragraph 5-3b.

(7) Evacuate the system in accordance with paragraph 5-3c.

(8) Charge the system in accordance with paragraph 5-3d.

(9) Install the hood.

8. COMPRESSOR (CONDENSER SECTION)

See paragraph 4-22 for inspection of installed items, cleaning and testing.

connect power from the air conditioner before performing maintenance on electrical components. The voltage used can be lethal.

Disconnect power.

Remove the intake air grille, the left side panel, the rear panel and the bottom grille. See figures 4-4 and 4-9.

Release the refrigerant in accordance with instructions in paragraph 5-3a.

Tag and disconnect the wire leads.

Debraz the suction and discharge lines from the compressor in accordance with instructions in paragraph 5-3e.

Remove the hex head cap screw and lock washer that holds the top of the compressor to the removable frame angle.

Remove the two flat head screws that hold the removable frame angle to the frame and carefully pull the removable angle up slightly to free the top of the compressor.

Set the condenser section up on blocks or carefully sling so that the screws holding the mounting feet of the compressor are accessible.

Remove the four flat head screws, lock washers and nuts from the mounting feet of the compressor.

Carefully remove the compressor from the unit.

Check the compressor for indications of compressor motor burnout.

Burnout of a compressor motor is indicated by lack of continuity of the motor windings and the condition of compressor oil, which must be determined after the compressor has been removed from the refrigeration system. Causes of compressor motor burnout include the following:

- (a) Low line voltage, which causes motor windings to overheat. Before burning out completely, the overheated windings cause chemical breakdown of the refrigerant and the oil to form sludge and other system contaminants.
- (b) Loss of refrigerant. An inadequate charge of refrigerant gas in the system reduces the amount of cooling gas within the compressor, resulting in gradual overheating of the motor and failure of the winding.
- (c) High head pressure. High head pressures can be caused by clogged or dirty condenser coils, screens, or by an inoperative condenser fan. High head pressure requires the compressor to work harder, creating additional heat which ultimately can result in motor burnout. Poor ventilation around the condenser, and extremely high ambient temperatures can also cause motor failure.
- (d) Moisture in system. Leakage of air into the refrigeration system starts a chain reaction which can result in motor burnout. Air contains oxygen and moisture which combined with refrigerant gas form hydrochloric and hydrofluoric acids. These combined with compressor oil form an acid sludge which is carried throughout the system, and which attacks the motor windings, causing short circuits and burnout.

These problems must be corrected or avoided to prevent repetition of the same. After removal of a bad compressor from the refrigeration system, remove all external tubing and tip the compressor toward the discharge port to drain a small quantity of oil into a clear glass container. If the oil is clean and clear, and does not have an acrid smell, the compressor did not fail because of motor burnout. If the oil is black, contains sludge and has an acrid odor, the compressor failed because of motor burnout, and the refrigeration system must be cleaned to prevent residual contaminants from causing repeated burnouts when the compressor is replaced.

anup procedure after a compressor motor burnout.

You must clean the entire refrigeration system after a burnout has occurred, since contaminants will have been carried to many corners and restrictions in the piping and fittings. These contaminants will soon mix with new refrigerant gas and compressor oil to cause repeated burnouts. To clean the system thoroughly, act as follows:

Remove the filter-drier, and blow down each leg of the refrigeration system. To do this, connect a cylinder of dry nitrogen to each filter-drier connection, in turn, and open the cylinder shutoff valve for at least 30 seconds at 50 psig (3.5 kg/cm²) pressure.

Connect the two filter-drier fittings with a jumper locally manufactured from refrigerant tubing and fittings.

Disassemble the expansion valve and temporarily remove the valve cage. Reinstall shell of power assembly, using a locally manufactured gasket between power assembly and body to prevent leakage. Tag and retain the valve cage for use at reassembly.

Connect the discharge line of the refrigerant system to the discharge side of a small diaphragm-type pump.

Connect a line containing a filter to the suction line in the unit.

NOTE

An unused filter-drier or other suitable medium may be used as the filter.

The other end of the temporary suction line should be connected to a small drum or suitable reservoir.

A line should be run from the bottom of the reservoir to the inlet of the pump.



Be sure there is adequate ventilation during this procedure.

Fill reservoir with fluorocarbon refrigerant, R-11, and start the pump. Continue filling the reservoir with refrigerant, R-11, until it begins to pour out of the return line. Continue flushing for at least 15 minutes.

Reverse the pump connections, replace the filter with a new filtering medium, and backflush the system for an additional 15 minutes.

valve. Remove the valve and reinstall the valve cage. Install new gaskets and assemble

- (13) Disconnect the dry nitrogen cylinder and immediately install a new filter-drier, making sure that direction-of-flow arrow points toward the sight glass. Cap or plug compressor connection. Compressor is not to be installed immediately.

Installation. See figure 4-16.

- (1) Carefully place the compressor in the unit and mount to the frame using four each flat head screw lock washers and nuts.
- (2) Move the removable frame angle down and install the two flathead screws that attach the ends of angle.
- (3) Attach the top mounting point of the compressor to the removable angle using a hex head cap screw and lock washer.
- (4) Braze the suction and discharge lines to the compressor in accordance with instructions paragraph 5-3e.
- (5) Connect the wire leads. See figure 4-7, wiring diagram.
- (6) Leak test the refrigeration piping in the area of the newly brazed joint in accordance with paragraph 5-3b.
- (7) Evacuate the system in accordance with paragraph 5-3c.
- (8) Charge the system in accordance with paragraph 5-3d.
- (9) Install the intake air grille, left side panel, rear panel and the bottom grille.
- (10) Connect power to the unit.

SIGHT GLASS (CONDENSER SECTION)

See paragraph 4-27 for inspection/test of installed items.

Replacement (figure 4-16).

- (1) Remove the intake air grille. See figure 4-8.
- (2) Release the refrigerant in accordance with instructions in paragraph 5-3a.
- (3) Loosen the flare nuts connecting the tubing and filter-drier to the sight glass and remove the sight glass.

Installation. See figure 4-16.

- (1) Connect and tighten the flare nuts to the sight glass.
- (2) Leak test the valve and newly connected tubing in the area of the valve in accordance with paragraph 5-3b.

The filter-drier assembly is a metal container which contains dehydrating and filtering media through which liquid refrigerant must flow. A new filter-drier must be installed in the refrigerant system whenever the system has been opened. See figure 4-16.

a. Replacement.

- (1) Remove the intake air grille. See figure 4-8.
- (2) Release the refrigerant in accordance with instructions in paragraph 5-3a.
- (3) Remove the screw, clamp and lock nut that support the filter-drier.
- (4) Loosen the flare nuts connecting the tubing and the sight glass to the filter-drier. Remove the filter-drier from the unit.

b. Installation. See figure 4-16.

- (1) Connect and tighten the flare nuts to the filter-drier.
- (2) Install the clamp that supports the filter-drier with a screw and lock nut.
- (3) Leak test the valve and newly connected tubing in the area of the valve in accordance with paragraph 5-3b.
- (4) Evacuate the system in accordance with paragraph 5-3c.
- (5) Charge the system in accordance with paragraph 5-3d.
- (6) Install the intake air grille.

5-11. RECEIVER (CONDENSER SECTION)

See paragraph 4-28 for inspection/ test of installed items.

a. Repair or Replacement. See figure 4-16.

- (1) Remove the intake air grille and the bottom grille. See figures 4-8 and 4-9.
- (2) Release the refrigerant in accordance with instructions in paragraph 5-3a.
- (3) Remove and examine the fusible plug located in the end of the receiver. If this plug is broken, replace it with a part number P580-STL (78857) or equal fusible plug.
- (4) Examine the receiver. If there is no other damage, skip steps a-4 thru b-4. If the receiver is damaged, continue with step 5.
- (5) Debraze the inlet and outlet tubes to the receiver in accordance with instructions in paragraph 5-3e.
- (6) Remove the four flat-head screws and the two receiver mounting brackets.
- (7) Carefully slip the receiver out of the unit.

b. Installation. See figure 4-16.

Evacuate the system in accordance with paragraph 5-3c.

Charge the system in accordance with paragraph 5-3d.

Install the intake air grille and the bottom grille. See figures 4-8 and 4-9.

CONDENSER COIL

graph 4-29 for inspection/test of installed items and cleaning.

pair or replacement. See figure 4-16. If the inspection/test results indicate only a leak in a return tube connection, perform only those steps necessary to repair the defect and skip to step b-3 to perform the remaining steps that are necessary.

WARNING

Disconnect power from the air conditioner before performing maintenance on internal components. The voltage used can be lethal.

Disconnect power.

Remove the following grilles and panels: discharge air grille, right upper louvered panel, louvered panel and the rear panel.

Release the refrigerant in accordance with instructions in paragraph 5-3a.

Tag and disconnect all electrical leads to the motor and items mounted on the condenser shroud.

Remove the four screws that attach the motor mounting brackets to the frame. Remove the motor fan assembly from the unit.

Remove two flat head screws and carefully pull the pressure switch and bracket assembly up out of the way of the work area.

Remove eight each screws and lock washers and carefully remove the fan shroud.

Debrazed the inlet and outlet tubes to the condenser in accordance with instructions in paragraph 5-3e.

Remove six flat head screws and carefully remove the condenser coil from the unit.

Installation. See figure 4-16.

Carefully position the condenser coil in the unit and attach it to the frame with six flat head screws.

Fit the tubing to the inlet and outlet connections on the condenser coil and braze the joints in accordance with instructions in paragraph 5-3e.

Leak test the refrigeration piping in the area of the newly brazed joints in accordance

Charge the system in accordance with paragraph 5-3d.

Carefully position the condenser fan shroud on the coil flange and attach it with eight each screw and lock washers.

Install the fan and motor assembly with four flat head screws. Check the fan for clearance by spinning the fan by hand. Clearance between the blade tips and fan shroud should be even. If necessary, loosen the screws and adjust.

Install the pressure switch and bracket assembly with two flat head screws.

Connect the electrical leads that were disconnected from the motor and items mounted on the condenser fan shroud. See tags on removed electrical leads and see wiring diagram, figure 4-7.

) Install the following grilles and panels: discharge air grille, right upper louvered panel, left louvered panel and the rear panel.

) Connect power to the unit.

EXPANSION VALVE (EVAPORATOR SECTION)

graph 4-17 for inspection/test of installed items.

adjustment. The expansion valve, as supplied with the unit, is preset at the factory. This valve should not be adjusted unnecessarily. When adjustment is necessary, see the following instructions:

Remove insulation from a spot on the suction line near the sensing bulb of the thermal expansion valve to be adjusted.

Install an accurate thermometer or the probe of a thermocouple on the bare spot, using a small amount of the thermal mastic, if available, to improve conductivity. Tape the thermometer bulb or thermocouple junction in position, and cover with insulating material.

Remove the left louvered panel from condenser section. See figure 4-9.

Connect a suitable pressure gage to the service valve and open the valve. See figure 4-16.

Operate the air conditioner in the cooling mode for about 30 minutes, observing the thermometer or thermocouple dial to see that the temperature has stabilized. When the temperature remains unchanged for at least two minutes, record the temperature and pressure.

Compare the recorded temperature and pressure with those in Table 5-1. The temperature measurement should register approximately 5°F (2.8°C) higher than the temperature listed on the Table.

If adjustment is necessary, remove the cap from the expansion valve and turn the adjusting stem counterclockwise to decrease the superheat and clockwise to increase the superheat. When adjusting the valve, make no more than one turn of the stem at a time and observe the change in the superheat closely to prevent overshooting the desired setting. Allow unit to stabilize before taking reading.

When the proper setting is obtained, replace the cap on the valve adjusting stem.

Remove the thermometer or thermocouple probe from the suction line, and replace the insulating material. Close the suction service valve, remove the pressure gage, and install the cap on the service valve. Do not start the unit until the adjustment is complete.

Temperature		Pressure		Temperature		Pressure	
F	Deg C	psig	kg/cm ²	Deg F	Deg C	psig	kg/c
	-12.3	14.64	1.029	66	18.9	65.03	4.57
	-11.1	15.84	1.113	68	20.0	67.58	4.76
	-10.0	17.08	1.200				
	-8.9	18.36	1.291	70	21.1	70.19	4.93
	-7.8	19.68	1.384	72	22.2	72.86	5.12
				74	23.3	75.60	5.31
	-6.6	21.04	1.479	76	24.4	78.39	5.51
	-5.5	22.44	1.578	78	25.6	81.25	5.71
	-4.3	23.88	1.679				
	-3.4	25.36	1.783	80	26.7	84.17	5.91
	-2.2	26.88	1.890	82	27.8	87.16	6.12
				84	28.9	90.22	6.34
	-1.1	28.45	2.000	86	30.0	93.34	6.56
	0	30.06	2.113	88	31.1	96.53	6.78
	1.1	31.72	2.230				
	2.2	33.42	2.349	90	32.2	99.79	7.01
	3.3	35.17	2.472	92	33.3	103.12	7.24
				94	34.5	106.52	7.48
	4.4	36.97	2.599	96	35.6	110.00	7.73
	5.5	38.82	2.729	98	36.7	113.54	7.98
	6.6	40.71	2.862				
	7.7	42.66	2.999	100	37.8	117.16	8.23
	8.8	44.65	3.139	102	38.9	120.86	8.48
				104	40.0	124.63	8.76
	10.0	46.70	3.283	106	41.1	128.48	9.03
	11.1	48.80	3.431	108	42.2	132.41	9.30
	12.2	50.95	3.582				
	13.3	53.16	3.737	110	43.3	136.41	9.59
	14.5	55.42	3.896	112	44.4	140.49	9.87
				114	45.6	144.66	10.17
	15.6	57.74	4.019	116	46.7	148.91	10.46
	16.7	60.11	4.226	118	47.8	153.24	10.77
	17.8	62.54	4.397				

WARNING

Disconnect power from the air conditioner before performing maintenance on internal components. The voltage used can be lethal.

- (1) Disconnect power.
- (2) Remove the right side and back panels.

- (2) Slip the thermal bulb into the clamp on the suction line. Make sure that bulb mates with the suction line. Tighten clamp and tape insulation back in place.
- (3) Leak test the valve and newly connected tubing in the area of the valve in paragraph 5-3b.
- (4) Evacuate the system in accordance with paragraph 5-3c.
- (5) Charge the system in accordance with paragraph 5-3d.
- (6) Install the right side and back panels.
- (7) Connect power to the unit.

5-14. EVAPORATOR COIL

See paragraph 4-47 for inspection/test of installed items and cleaning.

- a. Repair or replacement. See figure 4-33. If the inspection/test results indicate only a leak or tube connection, perform only those steps necessary to repair the defect and skip

WARNING

Disconnect power from the air conditioner before performing maintenance on components. The voltage used can be lethal.

- (1) Disconnect power.
- (2) Remove the following outside panels: front, right side, lower left side back, bottom.
- (3) Release the 1/4 turn fasteners and carefully pull the control panel out far enough to access the back of control panel.
- (4) Loosen the screws holding the thermostat sensing bulb clamps and remove the clamps.
- (5) Carefully pull the sensing bulb from around the end of the evaporator coil and tape the control panel.
- (6) Pull the control panel out of the way, taking care not to damage the harness or thermostat cable.
- (7) If the heaters have been in operation, let the unit cool down.
- (8) Tag and disconnect the electrical leads to the heater and thermostat.
- (9) Remove four each screws and lock washers and remove the heater and thermostat.
- (10) Slide the air filter up and out of the side clips on the coil.
- (11) Release the refrigerant in accordance with instructions in paragraph 5-3a.

Remove the four flat head screws and carefully remove the drain pan from the unit.
Remove two screws and remove the two sheet metal thermostat bulb clamps.

Remove four flat heat screws and carefully rotate the evaporator coil and remove the coil from the bottom of the unit. Retain the old coil to use as a sample for forming of distributor lines and location of insulated surfaces. The distributor and flare nut assembly are to be reused.

Installation. See figure 4-33.

Coat the mating surfaces of the coil and insulation with adhesive. Let both surfaces air dry until the adhesive is tacky but will not stick to the fingers. See figure 4-33 and old coil for location of insulated surfaces.

Starting with an end, carefully attach the insulation to the metal. Press to a firm contact all over.

Carefully form the distributor lines using the old coil as a sample.

Remove the distributor and flare nut assembly from the old coil and braze to distributor lines in accordance with paragraph 5-3e.

Carefully position the evaporator coil through the bottom of the unit and attach it to the frame with four flat head screws.

Fit the removed lines to the connections on the evaporator coil and the half couplings.

Braze the line joints in accordance with instructions in paragraph 5-3e.

Connect the flare nut to the expansion valve.

Leak test the refrigeration piping in the area of the newly assembled joints in accordance with paragraph 5-3b.

Evacuate the system in accordance with paragraph 5-3c.

Charge the system in accordance with paragraph 5-3d.

Carefully slide the filter into the side clips located on the upper side of the evaporator coil.

Install the two sheet metal thermostat bulb clamps using two screws.

Install the drain pan using four flat head screws.

Carefully mount the heater assembly to the evaporator coil flange using four each screws and lock washers.

Connect the electrical leads. Refer to the tags added when wires were removed and see the wiring diagram, figure 4-7.

Carefully form the sensing bulb capillary line around the end of the evaporator coil and install the bulb in the clamps and tighten the screws.

Reposition the control panel and engage the 1/4 turn stud fasteners.

See paragraphs 4-30 and 4-48 for access, inspection of installed items, and installation of outside

a. Repair.

- (1) Straighten all bent, twisted or dented frame members using conventional sheet metal methods.
- (2) Repair and reweld all cracked or broken welds.



Take care not to damage any components, wiring or piping when making repairs on frame

- b. Painting. Should touch up or refinishing be necessary, see TM43-0139.

REFERENCES

1.	FIRE PROTECTION	
	TB 5-4200-200-10	Hand Portable Fire Extinguishers Approved for Army Users
2.	LUBRICATION	
	C91001L	Fuels, Lubricants, Oil and Waxes
3.	PAINTING	
	TM 43-0139	Painting Instructions for Field Use
4.	MAINTENANCE	
	TM 38-750	The Army Maintenance Management System (TAMMS)
	TM5-4120-362-23P	Organizational and Direct Support Maintenance Repair Parts and Special Tools List
5.	CLEANING	
	Fed. Spec P-D-680	Dry cleaning solvent
6.	DESTRUCTION	
	TM 750-244-3	Procedures for Destruction of Equipment to Prevent Enemy Use
7.	SHIPMENT AND STORAGE	
	TM 740-90-1	Administrative Storage of Equipment
8.	RADIO SUPPRESSION	
	TM 11-483	Radio Interference Suppression

Section I

INTRODUCTION

General

This section provides a general explanation of all maintenance and repair functions authorized at various maintenance levels.

The Maintenance Allocation Chart (MAC) in Section II designates overall responsibility for the performance of maintenance functions on the identified end item or component. The implementation of the maintenance functions upon the end item or component will be consistent with the assigned maintenance functions.

Section III lists the special tools and test equipment required for each maintenance function referenced from Section II.

Section IV contains supplemental instructions on explanatory notes for a particular maintenance function.

Maintenance Functions

Inspect. To determine the serviceability of an item by comparing its physical, mechanical and/or electrical characteristics with established standards through examination.

Test. To verify serviceability and detect incipient failure by measuring the mechanical or electrical characteristics of an item and comparing those characteristics with prescribed standards.

Service. Operations required periodically to keep an item in proper operating condition, i.e., to clean (decontaminate), to preserve, to drain, to paint, or to replenish fuel, lubricants, hydraulic fluids, compressed air supplies.

Adjust. To maintain, within prescribed limits, by bringing into proper or exact position, or by setting operating characteristics to specified parameters.

Align. To adjust specified variable elements of an item to bring about optimum or desired performance.

Calibrate. To determine and cause corrections to be adjusted on instruments or test measuring and diagnostic equipments used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

Install. The act of emplacing, seating, or fixing into position an item, part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.

Replace. The act of substituting a serviceable like type part, subassembly, or module (component or assembly) for an unserviceable counterpart.

Repair. The application of maintenance services (inspect, test, service, adjust, align, calibrate, replace) or other maintenance actions (welding, grinding, riveting, straightening, facing, remachining, surfacing) to restore serviceability to an item by correcting specific damage, fault, malfunction, failure in a part, subassembly, module (component or assembly), and item or system.

- k. **Rebuild.** Consists of those services/actions necessary for the restoration of unserviceable equipment to like new condition in accordance with original manufacturing standards. Rebuild is the highest level of material maintenance applied to Army equipment. The rebuild operation includes the act of zeroing those age measurements (hours/miles, etc.) considered in classifying Army equipment components.

B-3. Column Entries

Columns used in the maintenance allocation chart will be limited to those shown. Entries for those not shown are explained below.

- a. **Column 1, Group Number.** Column 1 lists group numbers, the purpose of which is to identify assemblies, subassemblies, and modules with the next higher assembly.
- b. **Column 2, Component/Assembly.** Column 2 contains the noun names of components, subassemblies, and modules for which maintenance is authorized.
- c. **Column 3, Maintenance Functions.** Column 3 lists the functions to be performed on the item in column 2. (For detailed explanation of these functions, see paragraph B-2.)
- d. **Column 4, Maintenance Level.** Column 4 specifies, by the listing of a "work time" figure in appropriate subcolumn(s), the lowest level of maintenance authorized to perform the function listed. This figure represents the active time required to perform the maintenance function at the indicated level of maintenance. If the number or complexity of the tasks within the listed maintenance function varies at different maintenance levels, appropriate "work time" figures will be shown for each level. The number of man-hours specified by the "work time" figure represents the average time required to restore the item (assembly, subassembly, component, module, end item, or system) to a serviceable condition. The letter designations for the various maintenance levels are as follows:

C Operator or crew
O Organizational maintenance
F Direct support maintenance
H General support maintenance
D Depot maintenance

- e. **Column 5, Tools and Equipment.** Column 5 specifies, by code, those common tool sets (including tools) and special tools, test, and support equipment required to perform the designated maintenance function.
- f. **Column 6, Remarks.** Column 6 contains a letter code in alphabetical order which shall be used to identify remarks contained in Section IV.

B-4. Column Entries Used in Tool and Test Equipment Requirements

- a. **Column 1, Tool or Test Equipment Reference Code.** The tool and test equipment reference code identifies the tool or test equipment that relates with a maintenance function on the identified end item or component.
- b. **Column 2, Maintenance Level.** The lowest level of maintenance authorized to use the tool or test equipment.
- c. **Column 3, Nomenclature.** Name or identification of the tool or test equipment.
- d. **Column 4, National/NATO Stock Number.** The National or NATO stock number of the tool or test equipment.

- a. **Reference Code.** The code scheme recorded in column 6, Section II.
- b. **Remarks.** This column lists information pertinent to the maintenance function being performed indicated on the MAC, Section II.

APPENDIX B

Section II

MAINTENANCE ALLOCATION CHART

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools & Equipment	F																				
			C	O	F	H	D																						
01	ELECTRICAL CABLE AND INTERCONNECT- ING HOSES	Cable Assembly, Interconnecting	Inspect	0.5	0.4																								
			Test	0.5																									
			Repair	1.0																									
			Replace	0.2																									
		Refrigerant hoses	Test	0.2																									
			Replace																										
		Connector Electrical	Test	0.3																									
			Repair	0.5																									
			Replace	0.5																									
		02	CONDENSER SECTION	Panels, Grilles and Hood																Inspect	0.1								
																				Service	0.2								
																				Repair	1.0								
				Connector Electrical (Shorting Plug)																Test	0.3								
Repair	0.5																												
Replace	0.5																												
Electrical Wiring	Test			1.0																									
	Repair			1.0																									
	Replace			4.0																									
Fuse	Inspect			0.3																									
	Replace			0.3																									

[illegible]

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools & Equipment	(6) Remarks
			C	O	F	H	D		
	Electrical Wiring	Test	1.0						
		Repair	1.0						
		Replace	4.0						
	Switches	Test	0.3						
		Replace	1.0						
	Damper Assembly and Control	Service	0.2						
		Repair	1.0						
		Replace	3.0						
	Fan, Evaporator	Test	1.0						
		Replace	1.0						
	Motor, Evaporator Fan	Test	0.2						
		Replace	1.0						
	Capacitor	Test	0.3						
		Replace	1.0						
	Relay	Test	0.3						
		Replace	1.0						
	Silicon Junction Rectifier	Test	0.3						
		Replace	1.0						
	Refrigerant Piping	Test	1.0						
		Repair							
		Replace							
	Half Couplings	Test	0.2						
		Repair		8.0					
		Replace		8.0					
	Expansion Valve	Test	0.3						
		Adjust		8.0					
		Replace		8.0					
	Air Filter	Service	0.3						
		Replace	0.3	4.0					
				8.0					
	Heating Unit	Test	0.3						
		Repair	0.5						
		Replace	1.0						
		Test	1.0	8.0					

TOOLS AND TEST EQUIPMENT REQUIREMENTS

(1) Reference Code	(2) Maintenance Level	(3) Nomenclature	(4) National/NA Stock Num
		No special tools and test equipment required. Standard tools and test equipment in the following kits are adequate to accomplish the maintenance functions listed in Section II: Tool kit, service refrigeration Unit (SC 5180-90-CL-N18) Soldering Gun Kit	5180-00-597- 3439-00-930-

APPENDIX B

Section IV.

REMARKS MAINTENANCE ALLOCATION CHART

Reference Code	Remarks
	No supplemental instructions or explanatory remarks are required for the maintenance functions listed in Section II. All functions are sufficiently defined in Section I. Active time listed for maintenance task functions are with the air conditioner in off-equipment position.

Appendix lists Expendable Supplies and Materials you will need to operate and maintain the Air Corps. These items are authorized to you by CTA 50-970, Expendable Items (except Medical Class V, Re and Heraldic Items).

EXPLANATION OF COLUMNS

Column 1 - Item Number. This number is assigned to the entry in the listing and is referenced in the maintenance instructions to identify the material.

Column 2 - Level. This column identifies the lowest level of maintenance that requires the listed item.

Column 3 - National Stock Number. This is the national stock number assigned to the item; use this number to request or requisition the item.

Column 4 - Description. Indicates the federal item name and, if required, a description to identify the item. The last line for each item indicates the part number followed by the Federal Supply Code for Manufacturers (FSCM) in parenthesis, if applicable.

Column 5 - Unit of Measure (UM). Indicates the measure used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation, e.g., each (ea), lot (lt), pair (pr). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

(1) Item Number	(2) Level	(3) National Stock Number	(4) Description	(5) UM
1	F	9150-00-823-7905	Lub. Oil Ref. VV-L-825	GL
2	C	6850-00-264-9037	Dry Cleaning Solvent P-D-680 (81348)	GL
3	F		Dichlorodifluoromethane, Technical w/cylinder 22 lb Refrigerant -12 BB-F-1421, Type 12 (81348)	CY

C

nts, Initial	
or	
zational.....	
sembly, Interconnecting.....	
rs	
essor Run.....	
essor Start	
nsor Fan Motor Run.....	
ator Fan Motor Run.....	
j, Refrigerant	
Initial	
or	
zational.....	
denser	

Assembly, Interconnecting
 rs
 essor Run
 essor Start
 nser Fan Motor Run
 ator Fan Motor Run
 g, Refrigerant
 Initial
 or
 zational
 denser
 porator
 sor
 sor Run Capacitor
 sor Start Capacitor
 sor Start Relay
 er Coil
 er Fan
 er Fan Motor
 er Fan Motor Run Capacitor
 or, Electrical
 Supply
 ng Plug
 Panel
 , Operator's
 ss, Half

Control Switch.....
for

I Connector
 Supply
 ng Plug
 I Wiring
 nsor Section
 rator Section
 or Coil
 or Fan
 or Fan Motor

Expansion Valve

F

Fan, Condenser

Fan, Evaporator

Filter, Air

Filter-Drier

Frame, Condenser Section

Frame, Evaporator Section

Fuse

G

Grilles

Condenser Section

Evaporator Section

H

Half Couplings

Heating Unit

Hoods

Condenser Section

Evaporator Section

Hoses, Refrigerant

I

Installation

Interconnecting Cable Assembly

L

Leak Test

Louver, Fresh and Return

M

Main Power Switch

Motor, Condenser Fan

Motor, Evaporator Fan

O

Operating Procedure

Operation In

Cold, Extreme

Dusty Areas

Heat, Extreme

High Altitudes

Humid Conditions

Rainy Conditions

Salt Water Areas

Sandy Areas

Operator's Controls

P
Control
s, Outside
ndenser Section
aporator Section
ration for
vement
.....
rmance Data
g, Refrigerant
ndenser Section
aporator Section
r Relay
ure Switch
ntive Maintenance Checks and Services
erator
rganizational
cedures
erating
se of Equipment

R
lver
fier
fier, Silicon Junction
gerant Hoses
gerant Piping
ndenser Section
aporator Section
y, Compressor Start
y, Power
ir Procedures Refrigeration System

S
tor Switch
ce Valve
Glass
on Junction Rectifier
pring
ge, Administrative
h, Damper Control
h, Main Power
h, Pressure

Switch, Selector
Switch, Thermostatic Temperature Control

T

Thermostatic Temperature Control Switch
Troubleshooting
 Operator
 Organizational.....

U

Unpacking

V

Valve, Expansion
Valve, Service

W

Wiring, Electrical
 Condenser Section.....
 Evaporator Section.....

General, United States Army
The Adjutant General

DISTRIBUTION:

be distributed in accordance with DA Form 12-25C, Organizational Maintenance
Requirements for Environmental Equipment Air Conditioner, 6,000 BTU.

*U.S. GOVERNMENT PRINTING OFFICE: 1989--242-466/03755



THEN... JOT DOWN THE
DOPE ABOUT IT ON THIS
FORM. TEAR IT OUT, FOLD
IT AND DROP IT IN THE
MAIL!

PFC JOHN DOE
COA, 3^d ENGINEER BN
FT. LEONARD WOOD MO 63108

DATE

PUBLICATION NUMBER

TN 5-4120-362-13

DATE

21 Nov 61

TITLE

Air Conditioner: Wall or
base mounted 6,000 BTU/HR Cool

E EXACT... PIN-POINT WHERE IT IS

IN THIS SPACE TELL WHAT IS WRONG
AND WHAT SHOULD BE DONE ABOUT IT:

PAGE NO.	PARA- GRAPH	FIGURE NO.	TABLE NO.
6	2-1 a		
31		4-3	
25	line 20		

In line 6 of paragraph 2-1a the manual states the engine has 6 cylinders. The engine on my set only has 4 cylinders. Change the manual to show 4 cylinder

Callout 16 on figure 4-3 is pointing at a bolt. In the key to fig. 4-3, item 16 is called a shim. Please correct one or the other.

Ordered a gasket, item 19 on figure B-16 by NSN 2910-00-762-300. I got a gasket but it doesn't fit. Supply says I got what I ordered, so the NSN is wrong. Please give me a good NSN.

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

JOHN DOE, PFC (268) 317-7111

SIGN HERE:

John Doe

FILL IN YOUR
UNIT'S ADDRESS

FOLD BACK

DEPARTMENT OF THE ARMY

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE \$300

Commander
US Army Troop Support and Aviation
Materiel Readiness Command
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4300 Goodfellow Boulevard
St. Louis, MO 63120



THEN, JOT DOWN THE
DOPE ABOUT IT ON THIS
FORM. CAREFULLY TEAR IT
OUT. FOLD IT AND DROP IT
IN THE MAIL!

DATE SENT

PUBLICATION NUMBER

M 5-4120-362-13

PUBLICATION DATE

21 Nov 80

PUBLICATION TITLE

Air Conditioner: Wall or base
mounted 6,000 BTU/HR cooling

EXACT... PIN-POINT WHERE IT IS

FIGURE NO	PARA- GRAPH	FIGURE NO	TABLE NO
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IN THIS SPACE TELL WHAT IS WRONG
AND WHAT SHOULD BE DONE ABOUT IT:

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

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TION NUMBER
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PUBLICATION DATE
21 Nov 80

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CT. PIN-POINT WHERE IT IS

IN THIS SPACE TELL WHAT IS WRONG
AND WHAT SHOULD BE DONE ABOUT IT:

PARA-
GRAPH

FIGURE
NO

TABLE
NO

NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

SIGN HERE:

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PUBLICATION NUMBER
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PUBLICATION DATE
21 Nov 80

PUBLICATION TITLE
Air Conditioner: Wall or
base mounted 6,000 BTU/HR Co

BE EXACT... PIN-POINT WHERE IT IS

PAGE NO	PARA- GRAPH	FIGURE NO	TABLE NO
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IN THIS SPACE TELL WHAT IS WRONG
AND WHAT SHOULD BE DONE ABOUT IT:

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

SIGN HERE.

FILL IN YOUR
UNIT'S ADDRESS

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Materiel Readiness Command
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4300 Goodfellow Boulevard
St. Louis, MO 63120

1 centimeter = 10 millimeters = .39 inch
 1 decimeter = 10 centimeters = 3.94 inches
 1 meter = 10 decimeters = 39.37 inches
 1 dekameter = 10 meters = 32.8 feet
 1 hectometer = 10 dekameters = 328.08 feet
 1 kilometer = 10 hectometers = 3,280.8 feet

Weights

1 centigram = 10 milligrams = .15 grain
 1 decigram = 10 centigrams = 1.54 grains
 1 gram = 10 decigrams = .035 ounce
 1 dekagram = 10 grams = .35 ounce
 1 hectogram = 10 dekagrams = 3.52 ounces
 1 kilogram = 10 hectograms = 2.2 pounds
 1 quintal = 100 kilograms = 220.46 pounds
 1 metric ton = 10 quintals = 1.1 short tons

1 centiliter = 10 milliliters = .34 fl. ounce
 1 deciliter = 10 centiliters = 3.38 fl. ounces
 1 liter = 10 deciliters = 33.81 fl. ounces
 1 dekaliter = 10 liters = 2.64 gallons
 1 hectoliter = 10 dekaliters = 26.42 gallons
 1 kiloliter = 10 hectoliters = 264.18 gallons

Square Measure

1 sq. centimeter = 100 sq. millimeters = .155 sq. in.
 1 sq. decimeter = 100 sq. centimeters = 15.5 sq. in.
 1 sq. meter (centare) = 100 sq. decimeters = 1.55 sq. in.
 1 sq. dekameter (are) = 100 sq. meters = 1,076 sq. ft.
 1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres
 1 sq. kilometer = 100 sq. hectometers = .386 sq. miles

Cubic Measure

1 cu. centimeter = 1000 cu. millimeters = .06 cu. in.
 1 cu. decimeter = 1000 cu. centimeters = 61.0 cu. in.
 1 cu. meter = 1000 cu. decimeters = 35.31 cu. ft.

Approximate Conversion Factors

To change	To	Multiply by	To change	To
inches	centimeters	2.540	ounce-inches	newton-meters
feet	meters	.305	centimeters	inches
yards	meters	.914	meters	feet
miles	kilometers	1.609	meters	yards
square inches	square centimeters	6.451	kilometers	miles
square feet	square meters	.093	square centimeters	square inches
square yards	square meters	.836	square meters	square feet
square miles	square kilometers	2.590	square meters	square yards
acres	square hectometers	.405	square kilometers	square miles
cubic feet	cubic meters	.028	square hectometers	acres
cubic yards	cubic meters	.765	cubic meters	cubic feet
fluid ounces	milliliters	29.573	cubic meters	cubic yards
pints	liters	.473	milliliters	fluid ounces
quarts	liters	.946	liters	pints
gallons	liters	3.785	liters	quarts
ounces	grams	28.349	liters	gallons
pounds	kilograms	.454	grams	ounces
short tons	metric tons	.907	kilograms	pounds
pound-feet	newton-meters	1.366	metric tons	short tons
pound-inches	newton-meters	.11375		

Temperature (Exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C
----	------------------------	----------------------------	---------------------	----